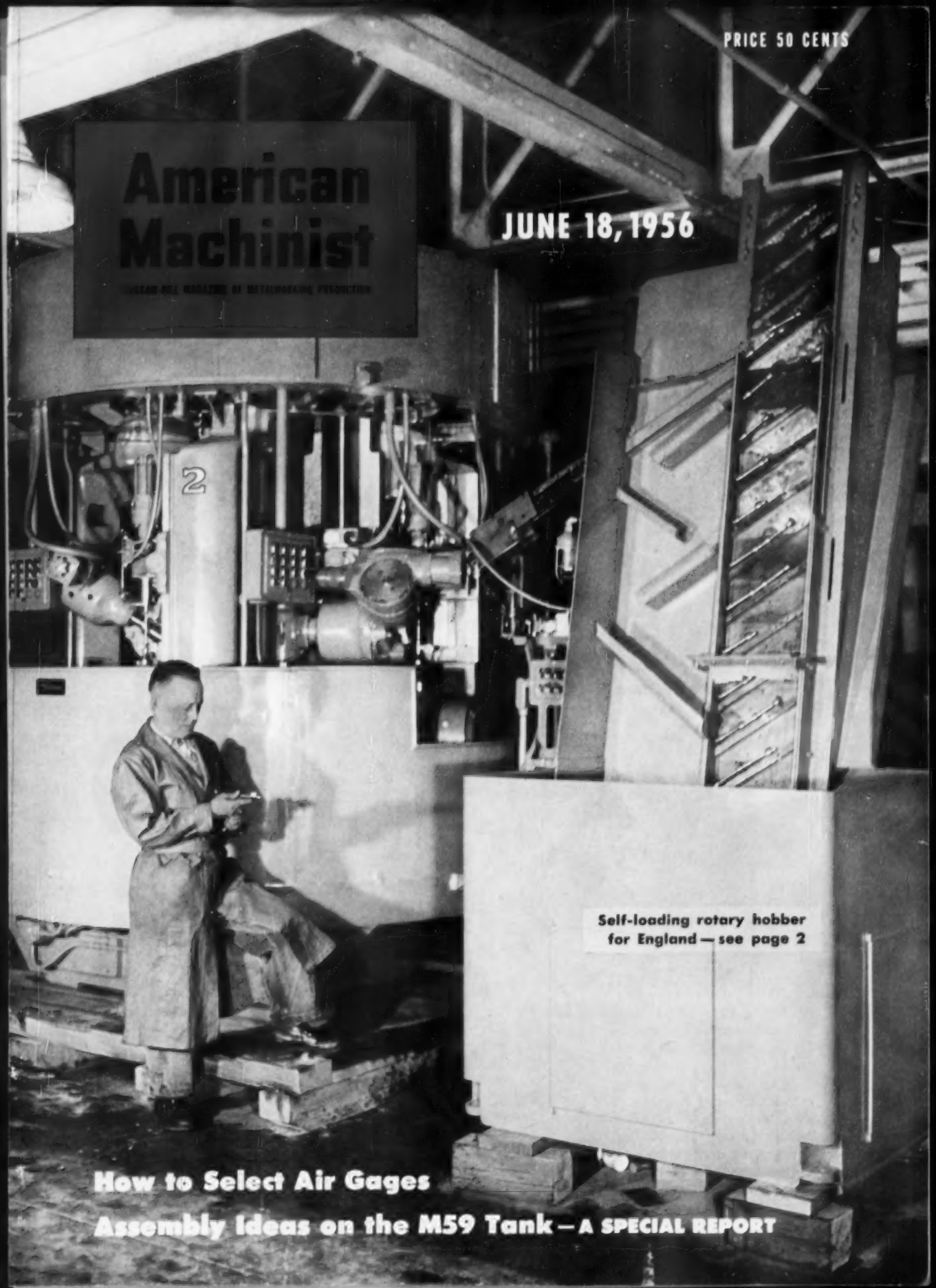
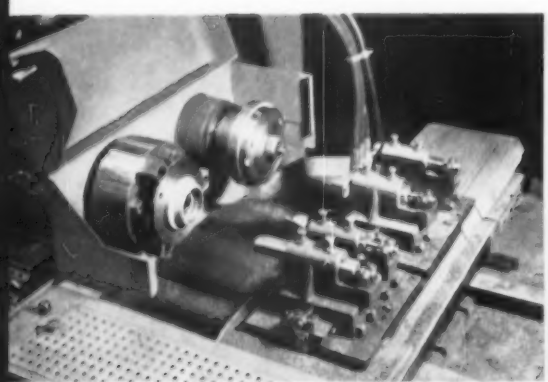

PRICE 50 CENTS
American Machinist
JUNE 18, 1956
Self-loading rotary hobber for England — see page 2
How to Select Air Gages
Assembly Ideas on the M59 Tank — A SPECIAL REPORT

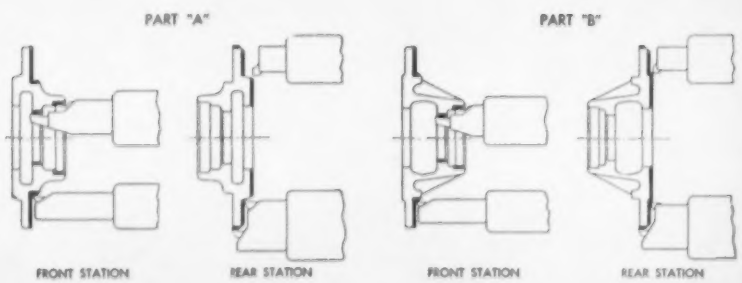
The ability of Heald

BORIZING* to

combine operations and reduce handling time can make other precision finishing methods obsolete, regardless of age of equipment

FOR EXAMPLE: *This One Bore-Matic Replaced Two Older Machines and Increased Production more than 50%*





This new Heald Model 321 Bore-Matic performs combined boring, turning and facing operations on both ends of two different differential bearing carriers, as shown in the diagrams above. The job was formerly done in sequential operations on two separate machines, at a net production of 105 parts per hour. Borizing on this single-machine setup increased production to 166 parts per hour, with closer tolerances, better finish and much easier operation.

It PAYS to come to Heald

HEALD®

**"Borizing is a copyrighted word meaning the application of any number or variety of precision finishing operations performed on a Heald Bore-Matic.*

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Subsidiary of The Cincinnati Milling Machine Co.

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American Machinist

MAGAZINE OF METALWORKING PRODUCTION

CONTENTS FOR JUNE 18, 1956

Vol. 100, No. 13

ADMINISTRATION

111 EDITORIAL *Burnham Finney*
137 SNOOPER BY APPOINTMENT *Round Table*
226 ARE WE LOSING THE RACE WITH RUSSIA? *McGraw-Hill Editorial*

SPECIAL REPORT

129 THESE ASSEMBLY IDEAS SAVE YOU MONEY *E J Tangerman*

TOOLING

120 MASTER BOARD CONTROLS CONTRACT-STAMPING LINE *Rupert Le Grand*
140 TAPERING, THREADING ATTACHMENT DISENGAGES TOOL *Carlos Perez*
140 SOFT TABLE CLAMP *Federico Strasser*
141 MOTORIZED TURRET BACKOFF RUNS TAP OR SOLID DIE *V C Boydston*
141 JACKSCREWS PREVENT ACCIDENTAL VISE OPENING *F La Saracina*
141 RIGGED TAPER ATTACHMENTS FOR INTERNAL THREADS *D W Baumback*
142 DISAPPEARING GROOVE TOOL CUTS BRONZE BUSHINGS *R E Kiehl*
142 MODIFIED SPRING PLUNGERS GAGE BLANKED STOCK *E P Boehnlein*
142 WHEEL CLEARANCE DRESSER SWINGS ON CENTERS *C F Kolbe*
143 CLAY-NEEDLE WIGGLER *Gosta Wernberg*
144 MORE ON MANDREL FOR THREADED PARTS *Clifford Malloy*

MATERIAL CUTTING, FORMING

138 DRUMS ALONG THE PRODUCTION LINE
143 CLUTCH MANDREL HOLDS CORED CASTINGS *B A Mallis*
143 TURRET WORK SUPPORT HELPS CLEAN CUTOFF *H J Gerber*
144 BANDSAW CUTS SMALLER CIRCLE WITH RADIATING CUTS *H J Gerber*
147 SPEEDS FOR MOUNTED WHEELS *Reference Book Sheets*

INSPECTION

113 HOW TO SELECT AIR GAGES *R J Thomas*
118 INSPECTION MACHINE MEASURES TRANSPARENCY DISTORTION *W A Heitzman*
124 ULTRASONIC RIG TESTS HELICOPTER BLADES
144 DOUBLE TAPERS CHECKED WITH SWINGING SINE FIXTURE *Charles Minaire*

HEAT TREATING

126 ISOTHERMAL QUENCHING IN SALT INCREASES TOOL LIFE *Diego Straniero*

ASSEMBLY

123 SPOT-WELDED RIBS MAKE ALUMINUM SHELVES . . . STIFF IN 30 SECONDS

NEWS OF METALWORKING

97 SPOT NEWS
99 WASHINGTON
101 DETROIT
103 MACHINE TOOLS
107 GAGING METALWORKING
154 NEWS OF METALWORKING
162, 233 NAMES IN THE NEWS

DEPARTMENTS

90 BACKLASH
147 REFERENCE BOOK SHEETS
164 EQUIPMENT, MATERIALS, PARTS
168e NEW BULLETINS
216 ROUND TABLE DISCUSSION
229 NEW BOOKS

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chips

GEAR HOBBER . . . Work blanks are automatically loaded on the Lees-Bradner rotary gear hobber shown on our cover. The 4-spindle machine is now producing the left-hand helical gear on the distributor driving spindle for a British car manufacturer. The unusual loading mechanism developed for this machine is described in the New Shop Equipment section of this issue.

ASSEMBLY IDEAS . . . We're fascinated by efforts to save the taxpayers' money, which explains our continuing interest (see *AM*—Mar 14 '55, p128) in the John Bean Tank Plant of Food Machinery & Chemical Corp. For our Special Report, Executive Editor Tangerman has rounded up the assembly techniques and some plant-service ideas that helped halve the cost of armored personnel vehicles. You should find ideas that will help you save in your own operations, in addition to the saving you are already getting as a taxpayer.

HEAT TREATING . . . A long-cycle isothermal treatment in salt baths, much like martempering, has produced some remarkable results in Italy on high-carbon, low-chromium drills. The treatment appears to increase toughness and wear resistance without much loss of hardness. Details on this "Isoperm" treatment have been collected by our Rome Bureau.

INSPECTION . . . Aircraft production continues to force development of special equipment. Two unusual inspection problems are dealt with in short articles. Convair has developed a machine to inspect transparent plastics for optical distortion. Developed to check aircraft windshields, it can be used to check distortion in the image seen through any transparent sheet. . . . Sperry Corp remodeled an old maintenance pit to provide an unusual rig for making 100% ultrasonic tests of helicopter blades for Vertol Aircraft.

CONTRACT STAMPING CONTROL . . . Stampings from 16 gage to $\frac{3}{8}$ in. are produced in a press line at the By-Products Div, Lukens Steel Co. With a master control board set up from an operations sheet, it is possible to operate the desired presses, control work direction by reversible conveyors, and move the product with a minimum of labor and in-process storage. Operation of the system is reported by Rupert LeGrand, senior associate editor.

TRIPLE THREAT . . . Our lead article, by Robert J Thomas (see biography), contains basic advice on selecting air gages. Principles of gage design and their application are included . . . Two short articles give examples of mechanized production, one in welding stiffeners to circular shelves, the other in producing steel drums.

COMING . . . *AM* for July 2 features a Special Report on models (of machine tools, that is) that will be an eye-opener. An article will show some of the ways in which tool design influences the cutting forces, others deal with coolant filtration for automatics, a fixture to generate large-radius segments, and unusual special machines from two different plants.

ROBERT J THOMAS, JR is the author of the lead article on "How to Select Air Gages." He studied at the Rhode Island School of Design and then spent two years in the Engineers Corps of the Army. Mr Thomas joined Federal Products Corp 15 years ago in the engineering department. Later he went into sales engineering and is now manager of air gage engineering. He has specialized on air and mechanical gages and spends much of his time in plants consulting on gage design.

Unitool*. . . *a fast, easy, low-cost way* to produce prototype bevel gears!

Now you can produce small quantities of spiral bevel, Zerol® bevel and hypoid gears with a comparatively small capital outlay and without specially trained personnel.

You can reduce the time and expense it takes to change your angular drive from a drawing board idea to a working model, too, because the Unitool Method produces good quality gears directly from the initial calculations.

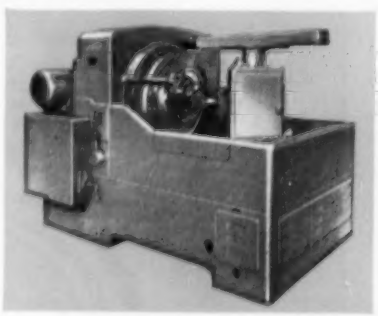
The Unitool Method is based on a fundamentally different theoretical approach to bevel gear generation. Only six different cutters are required to cut gears up to 14" pitch diameter—spiral bevel and Zerol bevel pairs of any ratio; hypoid pairs 3:1 ratio and higher. Because these cutters have a wide overlap in range, cutter diameter is not critical.

Calculations are short enough and easy enough for you to do in your own plant. Correct tooth thickness and position of contact are easily determined without requiring special operator training.

The Unitool Method is designed especially for the Gleason No. 106 and No. 116 Hypoid Generators which feature increased universal cutter tilt.

*Trademark

We will be glad to send further information on the Unitool Method and the two Gleason Generators best suited for it at your request.



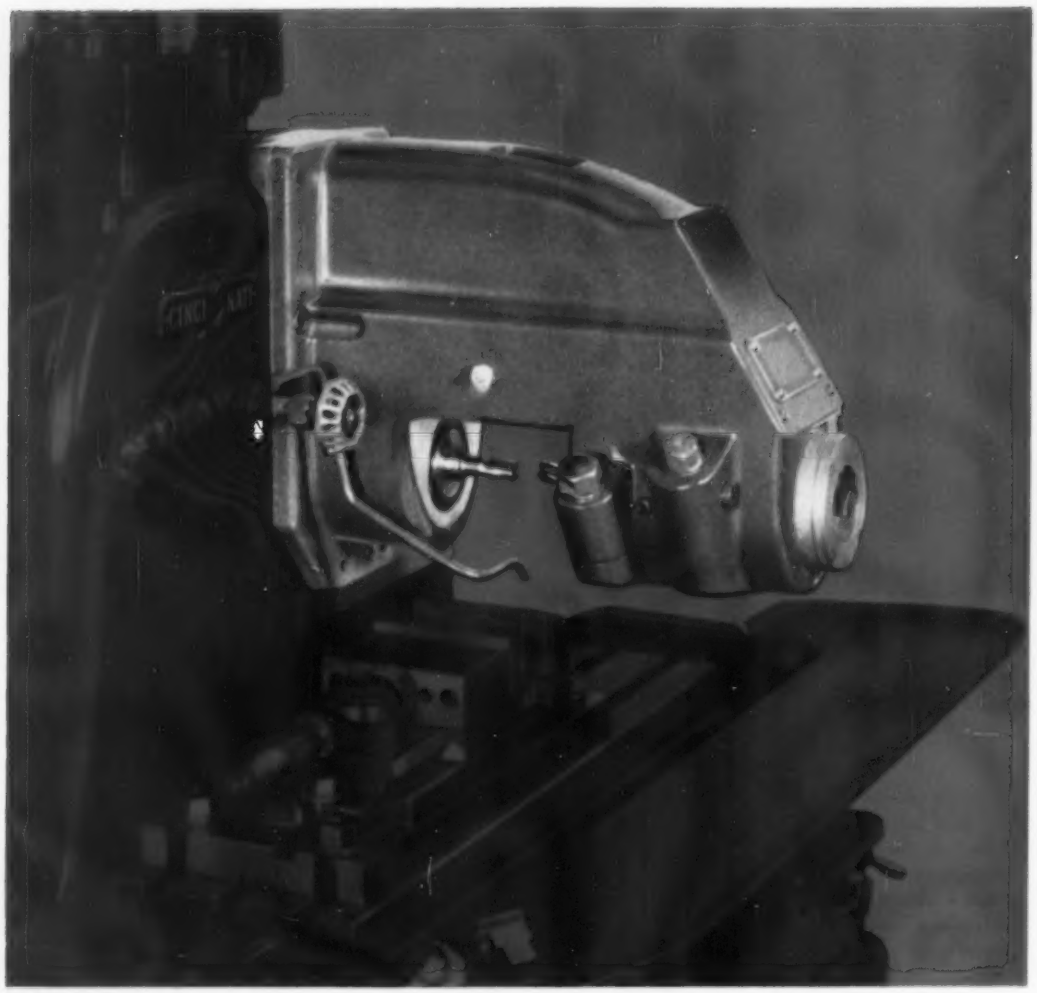
The Gleason No. 106 Hypoid Generator is a high-speed machine for spiral bevel, Zerol bevel and hypoid gears up to 8½" pitch diameter. Its larger counterpart, the No. 116 Hypoid Generator, handles the same type gears up to 18" pitch diameter.

GLEASON WORKS

Builders of bevel gear machinery for over 90 years

1000 UNIVERSITY AVE., ROCHESTER 3, N. Y.

A Head For



CINCINNATI No. 0-B Plain Rise and Fall Milling Machine equipped with duplex head.

CINCINNATI

CINCIN

MILLING MACHINES • CUTTER SHARPENING MACHINES • BROACHING MACHINES • METAL FORMING

Low-Cost Production

Duplex Head on Cincinnati 0-8 Plain Rise and Fall Mills an Extra Surface

This machine has a head for business. It's a CINCINNATI® No. 0-8 Plain Rise and Fall Milling Machine, equipped with a duplex head to mill **both sides** of small parts in **one cycle**, and **one handling** of the work.

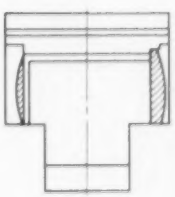
Production averages 223 parts per hour, about double what it would be without the Duplex Head. The drawing below indicates surfaces milled.

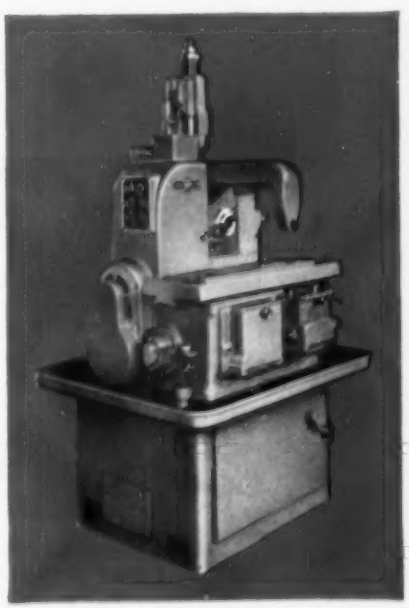
This equipment is the work of Cincinnati Application Engineers, a group of specialists who help metalworking industry reduce the cost of doing business. You can enlist their aid by sending blueprints and complete data on the parts which you suspect of being high-cost components. Meanwhile, you might like to know more about the highly productive 0-8 Milling Machines. Look in Sweet's Machine Tool File, or write for catalog No. M-1607-2.

THE CINCINNATI MILLING MACHINE CO. • CINCINNATI 9, OHIO

Drawing of part
(shaded areas indicate milled surfaces)

Part name . . . . . rear sight base
Material . . . . . steel forging
Operation . . . . . mill two sides
Production . . . . . 223 per hour





CINCINNATI No. 0-8 Plain Rise and Fall Milling Machine. Complete specifications in catalog No. M-1607-2.

NATI

MACHINES • FLAME HARDENING MACHINES • OPTICAL PROJECTION PROFILE GRINDERS • CUTTING FLUID

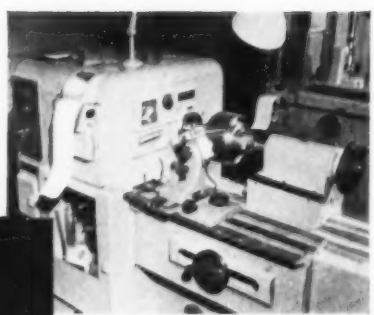
"PUTTING TEETH" IN

PHILADELPHIA GEAR WORKS INCORPORATED

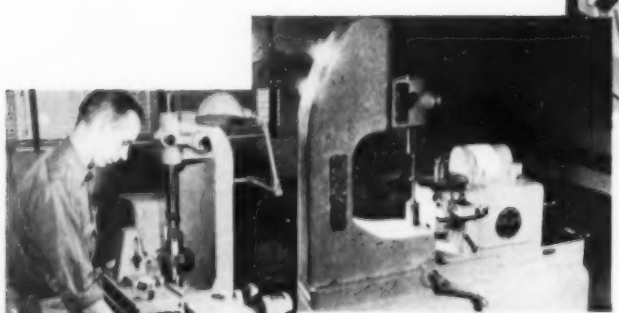
Fellows 36-Type Gear Shapers at Philadelphia Gear Works: powerful, accurate and fast on long runs or special jobs.

CUTTING

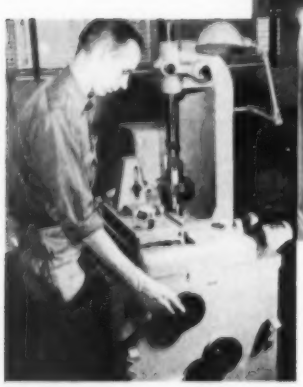
INSPECTION



Fellows No. 12H Lead Measuring Instrument checks lead, crown and taper and electronically provides charts of results for Philadelphia Gear.

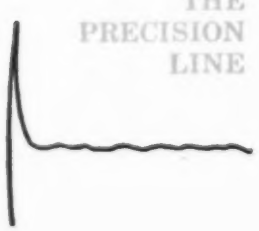


Fellows No. 20M Red Liner automatically records all gear errors in combination, giving Philadelphia Gear a composite check on quality.



Fellows No. 12M Involute Measuring Instrument at Philadelphia Gear is simple to set up, checks involute profiles, and records any departure from specifications.

THE PRECISION LINE



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Integrated Fellows Gear Shapers and Inspection Instruments Assure Close-Tolerance Production

Consistently high quality is maintained at Philadelphia Gear Works by fast and accurate Fellows Gear Shapers teamed with Fellows Inspection Instruments. Inspection and recording by Fellows Instruments gives accurate warning of production errors and their nature, provides visible proof of gear quality. 'Phillie Gear' relies on Fellows equipment for producing gears for their famous Speed Reducers as well as many other industrial spur or helical gears.

Integrated production and inspection with Fellows equipment assures unified responsibility for meeting standards and precise quality control at lowest possible costs.

Ask any Fellows Representative for full information about the complete line of Fellows Gear Shapers, Shaving Machines, and Gear Inspection Instruments.

THE FELLOWS GEAR SHAPER COMPANY
78 River Street, Springfield, Vermont
Branch Offices: 319 Fisher Building, Detroit 2
5835 West North Avenue, Chicago 39
2206 Empire State Building, New York 1
6214 West Manchester Avenue, Los Angeles 45

Fellows *Gear Production Equipment*

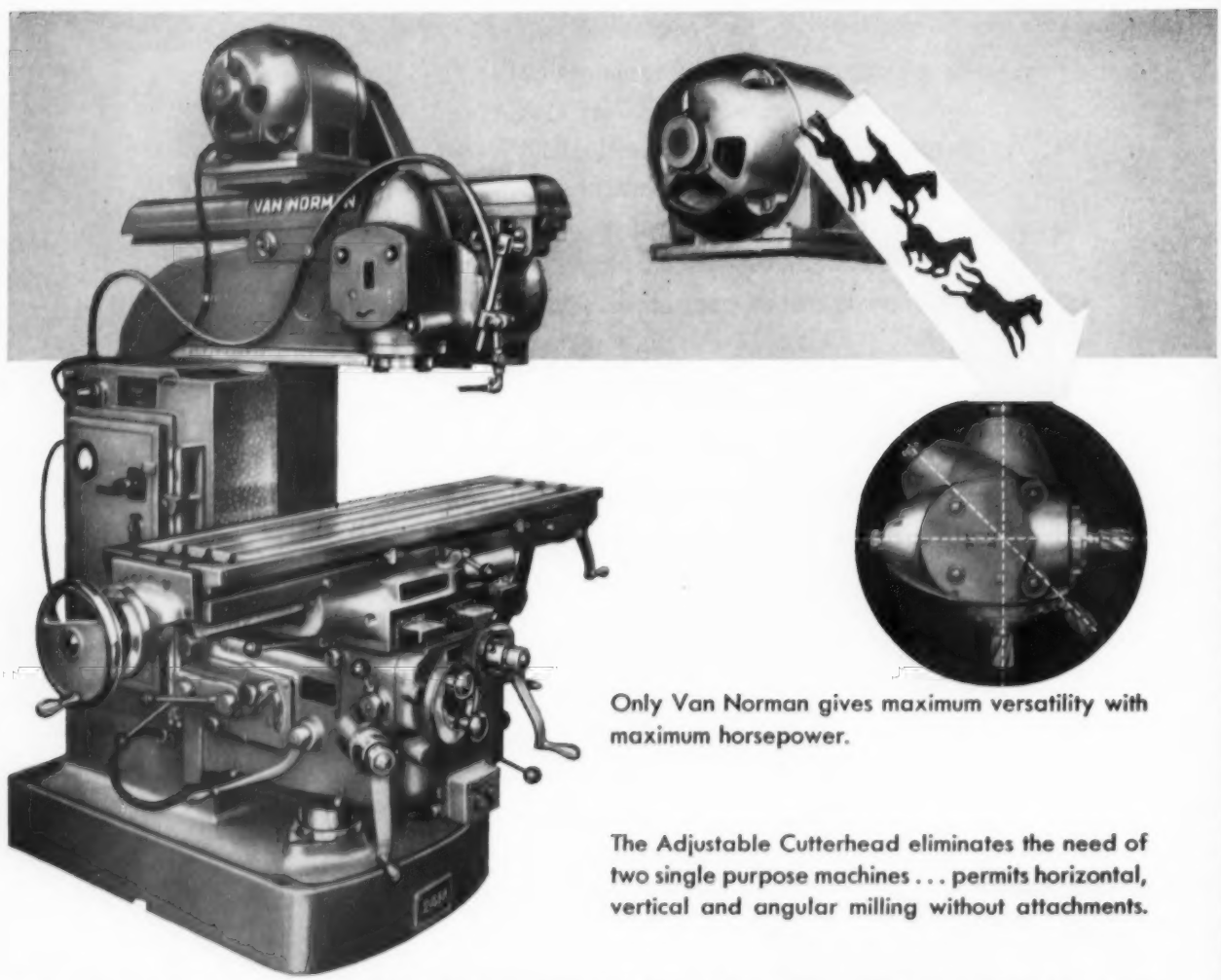
Here's a Profitable Equation:

1 Van Norman Ram Type Miller

RESULT

LESS Capital Investment

MORE Machine Productivity



Only Van Norman gives maximum versatility with maximum horsepower.

The Adjustable Cutterhead eliminates the need of two single purpose machines . . . permits horizontal, vertical and angular milling without attachments.

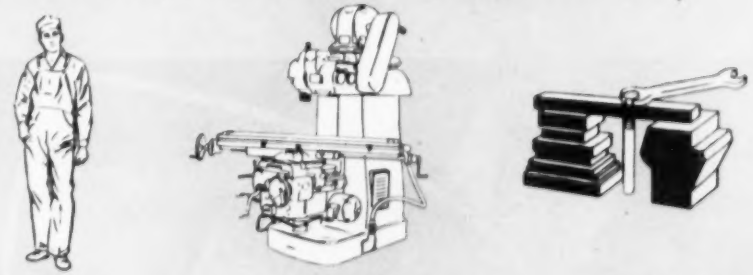
VAN NORMAN MACHINE

MANUFACTURERS OF — Ram and Column Type Milling Machines, Cylindrical Grinders, Spline and Gear Grinders, Oscillating Radius Grinders, Special Production Grinders, Centerless Grinders.

=2 Single Purpose Machines

Which would you rather have?

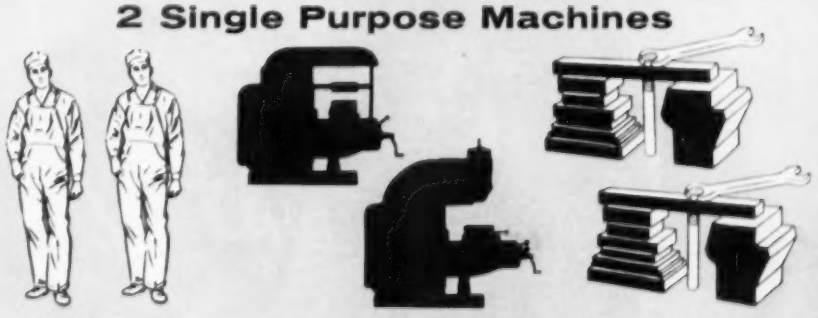
1 Van Norman Ram Type Miller



1 Operator | 1 Machine | 1 Complete Setup

or

2 Single Purpose Machines



2 Operators | 2 Machines | 2 Complete Setups

You can own a Van Norman Ram Type Milling Machine for as little as $.81 per day per $1000. investment.

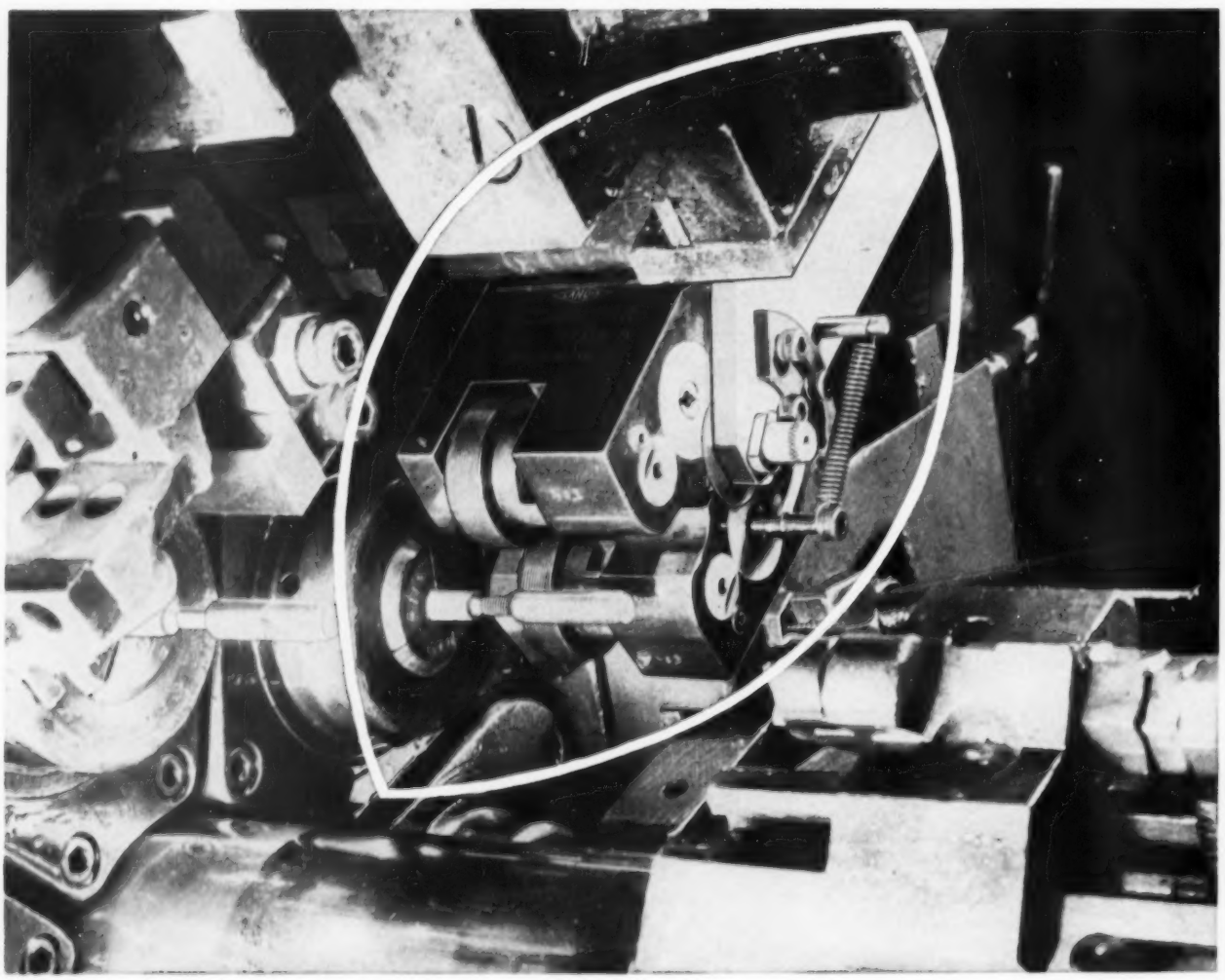
Write for catalog and purchase plans giving complete details on all Van Norman Ram Type Millers.

Don't wait . . . for extra profits install a Van Norman now! They are available on many purchase plans — Outright sale . . . Purchase on conditional sales contract up to 5 years . . . Pay as you depreciate. See your dealer or write Van Norman Machine Company.

Lease and Conditional Sales Contracts not available to Export.

COMPANY | **SPRINGFIELD 7, MASSACHUSETTS**

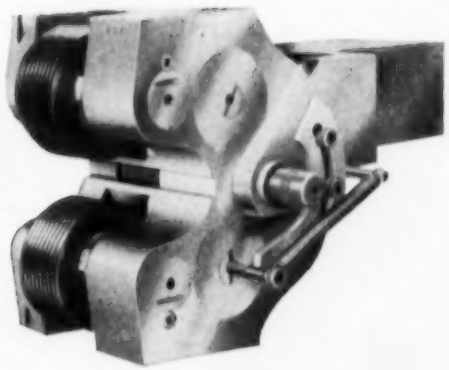
Over 1,100,000 threads



THE WORLD'S LARGEST MANUFACTURER OF THREADING EQUIPMENT

CUTTING - TAPPING - GRINDING - ROLLING

with 1 set of Rolls



The economy of LANDIS Thread Rolling Attachments due to long roll life is being demonstrated in the production of studs at the M & S Morenci Corporation in Morenci, Michigan.

#10-32 pitch NF threads, .350" long, are rolled on 1020 screw stock using a #14 GA LANROLL Attachment on a 9/16" Acme-Gridley Automatic. The Attachment is operated in the 4th position, rolling next to the collet .030" back of the shoulder, and threads are held to ±.00025" on the pitch diameter. 1,100,000 threads have been produced to date with the original set of roll dies. Another Lanroll Attachment later placed in operation on the same job has to date produced 500,000 threads with its original rolls.

This long roll life is a result of the basic design of the Lanroll Attachment incorporating patented new principles. A degree of stabilization never before obtained in a tool of this type is ensured between the workpiece and the attachment. Open construction allows the use of thread rolls of the maximum diameter, distributing wear over an increased area. The accuracy and wear-resistance of the rolls themselves is the result of more than 50 years experience in the manufacture of threading tools. These rolls are precision-ground to produce uniform, accurate threads of the highest quality.

LANROLL Attachments are made in five sizes for use on bar automatics and turret lathes to roll both fine and coarse pitch threads to Class 4 tolerances. Quick and easy set-up changes assure operation of the attachment for every size within its range as though it were exclusively engineered for the particular work being threaded. The M & S operation shown here is an example of this set-up simplicity. Using only the handbook furnished with the Attachment, a satisfactory production set-up was made by a set-up man with no previous thread-rolling experience.

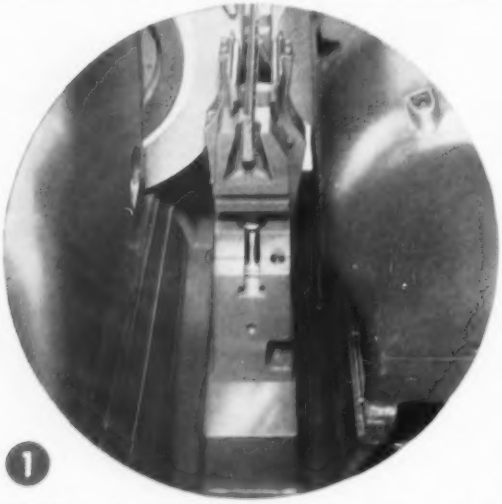
For more detailed information on construction and many exclusive features, send specifications and ask for Bulletin G-96.

LANDIS *Machine* COMPANY

WAYNESBORO • PENNSYLVANIA • U. S. A.

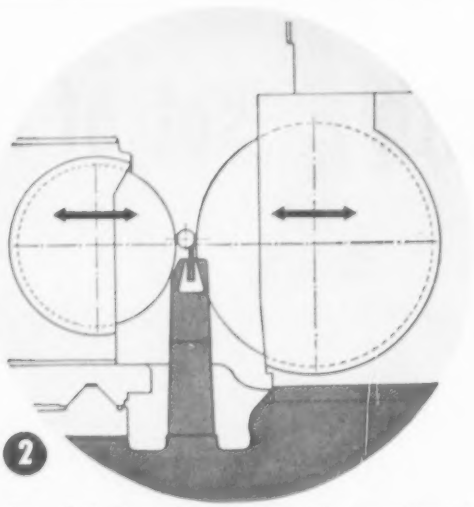
450C

4 reasons why Landis centerless



1

"Rigid" work rest Solid support permits extra heavy cuts without loss of accuracy or finish.



2

Landis method of centerless grinding Work positioned on rigid work rest—Grinding and Regulating Wheel Heads slide on hand scraped ways.

3

Completely adjustable regulating wheel head

a. Tilt adjustment
b. Swivel adjustment
c. Wheel feed handwheel
d. Wheel aligning screw

4

***Both* grinding and regulating wheel spindles have Microsphere bearings** For fast spark-out . . . close tolerances . . . fine finishes

LANDIS

precision grinders

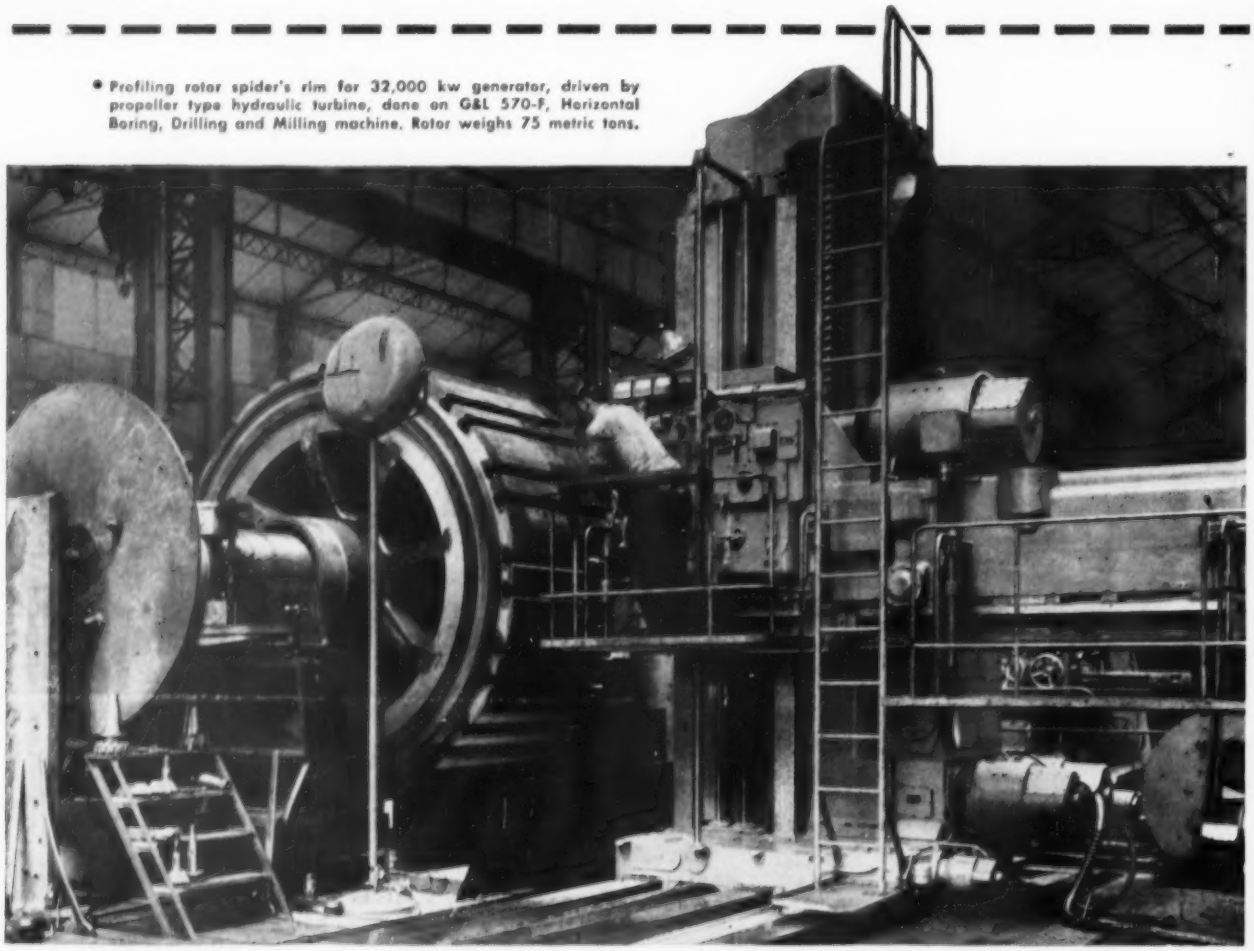
grinders lower production cost

No. 12 Centerless Grinder

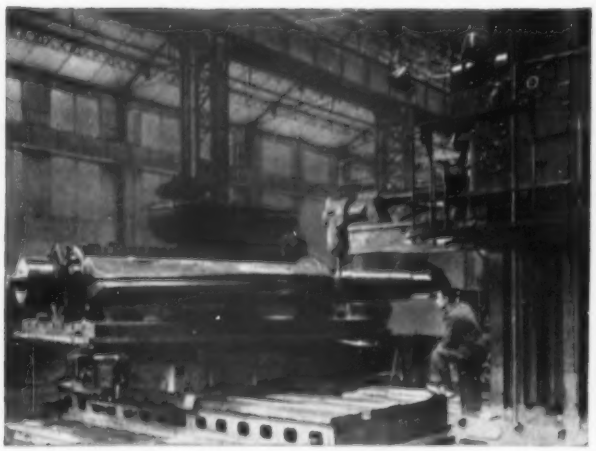
LANDIS TOOL COMPANY / WAYNESBORO, PENNSYLVANIA

UNSURPASSED ADAPTABILITY

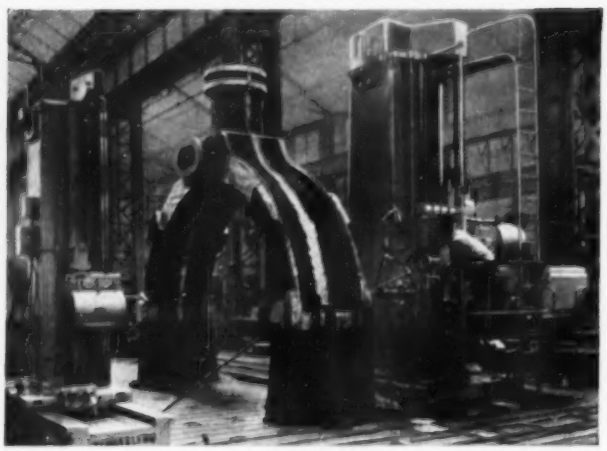
• Profiling rotor spider's rim for 32,000 kw generator, driven by propeller type hydraulic turbine, done on G&L 570-F, Horizontal Boring, Drilling and Milling machine. Rotor weighs 75 metric tons.



Societe Des Forges & Atelier du Creusot (Usines Schneider), France.



• Angular milling attachment, mounted on heavy-duty underarm, permits milling and grooving circular surfaces of steel turbine wicket gate. Rotary table, with ample power for feeds and rapid traverse, assures smooth, accurate milling of workpiece.



• Employing main spindle feed and vertical movement of headstock, operator performs angular and vertical milling of pads on weldment. All operations are controlled from platform or portable control station.

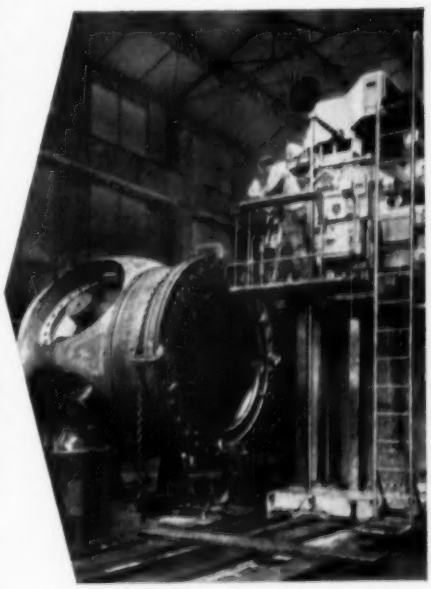
to machine difficult-to-reach surfaces

Societe Des Forges & Atelier du Creusot uses Giddings & Lewis Model 570-F Horizontal Boring, Drilling and Milling Machines with underarm support . . . attachments and accessories. Result — greatly extended scope of operations on huge workpieces.

Hydraulic turbine-generator units, swing jaw and gyratory crusher components and other large castings are only a few of the giants machined to exact tolerances on Giddings & Lewis Model 570-F (floor-type) Horizontal Boring, Drilling and Milling machines. Because these machines are able to perform a wide variety of operations in a single setup, they're always in great demand at Societe Des Forges & Atelier du Creusot (Usines Schneider), France.

The 50 Series machines, illustrated here, are equipped with 7" dia. main and 2.5" dia. auxiliary spindles, each covering a different range of speeds and feeds. Continuous feed facing and boring head permits even greater flexibility of operation involving machining of difficult-to-reach surfaces. Angular milling attachment, mounted on heavy-duty underarm support, allows milling, facing and boring operations at right angles to spindle as far as 60" from the headstock. What's more, use of a power-driven revolving table eliminates numerous extra set-ups of workpiece.

If you'd like to know how to reduce set-up time, speed-up production when machining huge workpieces, contact your Giddings & Lewis representative or write to factory.



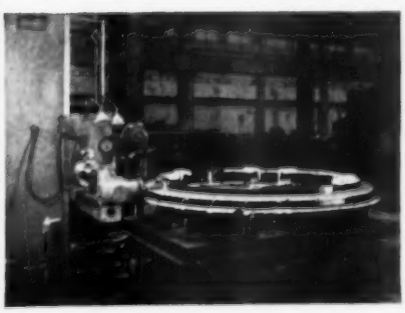
Literature Available:

Ask for Catalog No. 50-F with details on 50 Series Horizontal Boring, Drilling and Milling machines.

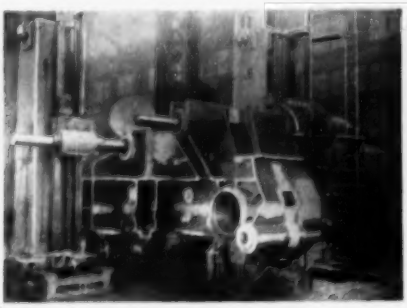
G & L and HYPRO DIVISION
GIDDINGS & LEWIS MACHINE TOOL CO.
FOND DU LAC, WISCONSIN

Builders of the world's finest heavy-duty Horizontal Boring, Drilling and Milling Machines — table, floor and planer types; Hypro Double Housing and Open-side Planers, Planer Type Milling Machines and Vertical Boring Mills; and Davis Cutting Tools.

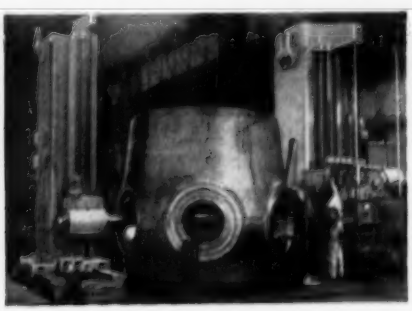
• Drilling, boring, reaming, tapping, back facing and countersinking a series of 100mm diameter holes in upper flange of hub for mounting adjustable turbine runner blades accomplished on G&L Model 570-F Horizontal Boring, Drilling and Milling machine.



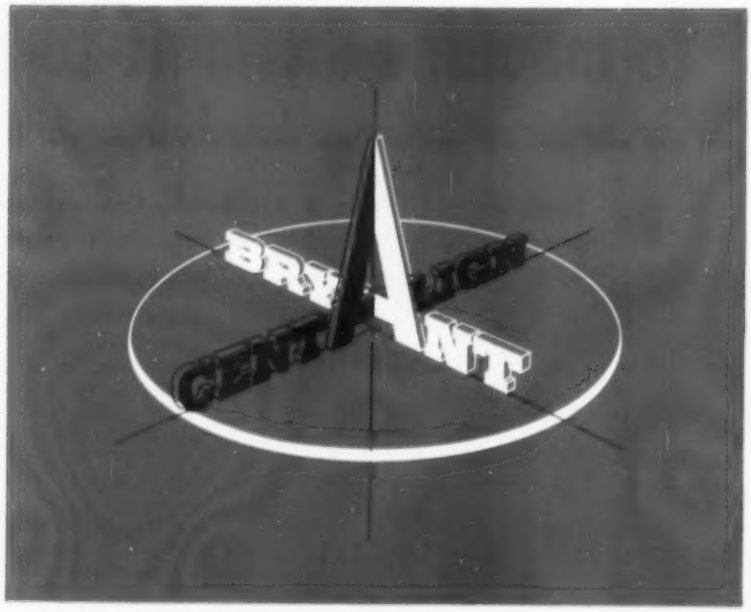
• 90° angular milling attachment on underarm permits precise circular milling. Race width, 250mm; cutting depth, 4mm; circular feed, 20mm per min.



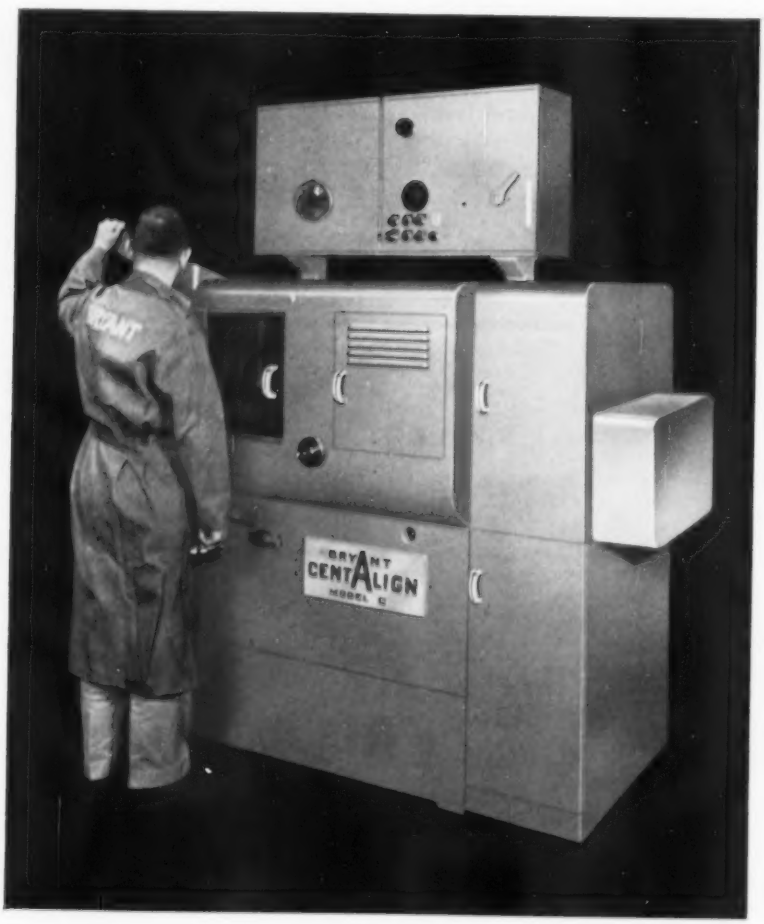
• Bearing and shaft bores of 27 (metric) ton jaw crusher frame are precision-machined on G&L Model 570-F machine. Long boring bars, heavy cutting tools are held in perfect alignment with G&L end-support.



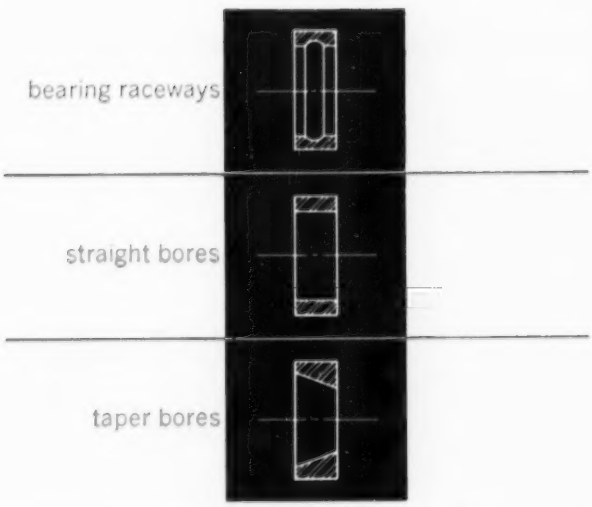
• Steel hub (for Kaplan adjustable blade hydraulic turbine-generator unit) is line bored on G&L Model 570-F machine. Boring bar is mounted on continuous feed facing head which handles all boring operations.



The Fastest Internal Grinder



for



Production runs prove that the Bryant "Centalign" cuts internal grinding time 20% to 50%!

The "Centalign" is completely new, in design, in construction and in performance. Its high production rates, stability, accuracy and dependability result from completely new concepts like these: **1.** All loads and controlling forces are on a common plane, reducing deflection to a minimum and insuring permanent alignment. **2.** Control of machine function by readily interchangeable cam units for quick job change-over and precision machine operation. **3.** Simplified hydraulic servo control system combining the advantages of both cam- and hydraulically-operated machines for accurate machine control and extremely smooth, responsive operation. **4.** Unit-type construction, ideal for use in automated lines. **5.** Extremely rigid, stable construction, guaranteeing continually accurate production.

If internal grinding efficiency is important to you, you can't afford not to investigate the "Centalign". Ask for an immediate demonstration!

BRYANT Chucking Grinder Co.

10 CLINTON STREET, SPRINGFIELD, VERMONT

Offices: Indianapolis • Cleveland • Chicago • Detroit • Mt. Vernon, N. Y. • Philadelphia

Internal Grinders • Boring Machines • Internal & External Thread Gages • Granite Surface Plates • Magnetic Drums for Computers

CYLINDRICAL GRINDERS

10" Type CTU and 14" Type LCTU. Semiautomatic or plain. For plunge or traverse operations, from roughing cuts to finest finishing. Can take a wide range of multi-wheel mounts. In production line and job shop work these machines have doubled production, replaced several machines, eliminated extra operations. *Catalog No. 1787*

10" Type CV-A and 14" Type LCV-A Angular Wheel Slide. Semiautomatic machines that grind thrust surfaces and adjacent diameters in one fast, automatic plunge operation. They leave a concentric grain pattern in the thrust surface finish, assuring a better seal surface and appearance. *Catalog No. 1658*

Type CM-1 Heavy Duty Multi-Wheel. Semiautomatic. Makes four or more cuts simultaneously, in a single plunge-grind cycle. Brings new speed, accuracy and economy to the grinding of multi-diameter parts. Many automatic features, including one-lever control. *Catalog No. 1550*

ROLL GRINDERS

Type C-2. A heavy duty machine, featuring faster cutting, quicker set-ups, easier operation. Available as a plain, semiautomatic or roll grinder. One-lever control of grinding cycle on the semiautomatic. As a roll grinder it includes the famous Norton tilting wheel head. *Catalog No. 1827*

CAM GRINDERS

NO. 3 CAM-O-MATIC® Cam Grinder. An automatic, hydraulic machine that is setting new standards for production, precision and finish. Grinds all cams and the camshaft eccentric successively and automatically, in one handling. Entire operation geared to split-second efficiency. *Catalog No. 191*

Check these guide books to

bigger grinding profits

Get the facts on how Norton grinding machines can benefit your production

In building the world's largest line of grinders and lappers — including automatic machines and machines for specialized operations — Norton offers you the greatest opportunities to modernize.

A representative selection of Norton machines is listed here, together with their catalogs. It will pay you to send for any catalog that concerns your grinding or lapping operations. Learn how replacing your obsolete equipment with new Norton machines will enable you to meet competition with the best production tools in the field. Learn also, how the Norton Lease and Financing Plans enable you to modernize, yet conserve your capital.

Ask your Norton representative for the literature you want, or write direct. And remember: only Norton brings you such long experience in both grinding machines and grinding wheels — to bring you the "Touch of Gold" that helps you produce more at lower cost. NORTON COMPANY, Machine Division, Worcester 6, Mass.

CRANKPIN GRINDERS

Automatic Transfer Type. For completely automatic crankpin grinding — a news-making Norton *"first."* Locates, grinds, gages, transfers — all automatically — cutting costs on each crankshaft ground. Typical of Norton's rapid progress in automatic operation. *Catalog No. 1837*

CUTTER AND TOOL GRINDERS

No. 20 Cutter And Tool Grinder. Fastest, most versatile machine in its class. Wheel head tilts 15° above or below horizontal and swivels through 360°, simplifying many difficult grinding jobs. Easy to set up, operate and maintain. *Catalog No. 189*

No. 2 BURA-WAY Tool Grinder.* Unequalled for grinding convex single point and form tools. Generates, produces and maintains relief angles constant in the direction of the feed. Duplicates the master tool form exactly. Extends the life of carbide-tipped and other tools. *Catalog No. 220*

UNIVERSAL GRINDERS

Type U-4, 12" x 36" and 12" x 48". Quick, easy set-ups plus fast grinding action save time and costs on a wide variety of external, internal, face and angular wheel-slide jobs. Simply turning a dial gives an infinite number of works speeds over its 40 to 400 rpm range. *Catalog No. 231*

LAPPERS

HYPROLAP Lapping Machine No. 48F.* An extremely fast, high production machine for single or parallel face flat lapping. Bonded abrasive laps produce work pieces free of grit. Three arrangements: plain, timed cycle; automatic continuous feed; semiautomatic continuous feed. *Catalog 1954*

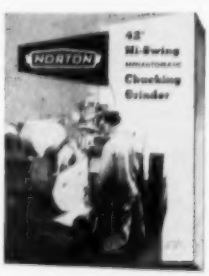
Vertical Lapping Machine No. 16VC. Outstanding productive capacity for flat work up to 3" x 5" and cylindrical work up to 3" diameter. Can produce optically flat surfaces and diameter tolerances in millionths, with fine repetitive accuracy. *Catalog No. 212.*

SURFACE GRINDERS

8" x 24" Hydraulic. Grinds plane surfaces speedily and economically, in large stock removal or close tolerance operations. Designed with both hand and hydraulic table cross feed. Convenient controls and easy accessibility reduce operating and maintenance time. *Catalog No. 190*

SPECIAL GRINDERS

42" Hi-Swing Semi-Automatic Chucking Grinder. For rapid, accurate grinding of large diameter, short parts, such as jet engine compressor wheels and similar components. Takes work held by chucks, face plates or special fixtures and permits grinding several surfaces without disturbing the set-up. *Catalog No. 1780.*



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GRINDERS and LAPPERS

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Why is COUNTROL

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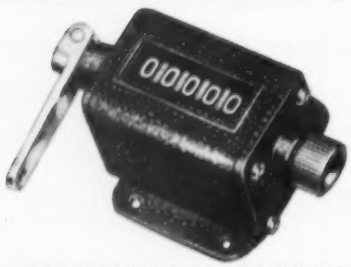
Countless times a day, every business needs to know "how many? . . . how much? . . . how far? . . ." and many other questions that can be answered only by facts-in-figures. But how to get these figures . . . from so many different machines, processes, operations and systems? Veeder-Root Counters are doing it every day, by means of:



MECHANICAL COUNTING

Small Resets count strokes, turns, or pieces . . . are used by thousands for moderate duty in parts inspection, quality control, conveyors, machine tools, light presses, etc.

HAND COUNTING

Where objects or units cannot be counted electrically or mechanically, hand-operated counters like this Hand Tally do the job. For instance, quick spot checks of production or performance, traffic count, inventory, etc. Fits palm of hand, counts one for each pressure of thumb lever, resets to zero by turning knob.

ELECTRICAL COUNTING

These remote-indicating counters bring your production machines as close as your office wall. AC or DC, they can be connected in series with any simple switch, and will transmit production figures *instantly* over any distance. May be panel-mounted in groups.

CONTROLLING

Set it for the exact number of turns, pieces, or operations required . . . and this Predetermining Counter will control the run *exactly* . . . preventing over-runs and shortages. When the predetermined number is reached, counter will light a light, ring a bell, or actuate a stop-motion.

IN SUM: *If it can be counted or controlled . . . count on Veeder-Root to do it. Get in touch with your Industrial Supply Distributor for standard counters for application to your production machines and processes. And get in touch with Veeder-Root for counters to be built into original equipment.* **Veeder-Root Inc., Hartford 2, Connecticut.**

Insist on Standard

VEEDER-ROOT COUNTERS

from your Industrial Supply Distributor

GARDNER WIRE-LOKT® CONSTRUCTION

Assures Maximum Safety . . . Low Operating Costs

FAST CUTS
Corrugations speed the grinding of large area work or thin parts without burning.

FINE FINISHES
For light stock removal smooth face discs give quality finishes and close tolerances.

FULL VALUE
The entire rated thickness of the abrasive is usable.

WIRE-LOKT® SAFETY
Heavy steel mesh securely imbedded in the abrasive assures maximum safety.

117A

Gardner Abrasive Specialists give you the advantages of long experience gained from making *both* grinding machine and abrasive discs. Individual specifications will be developed to handle *your* particular grinding job.

GARDNER

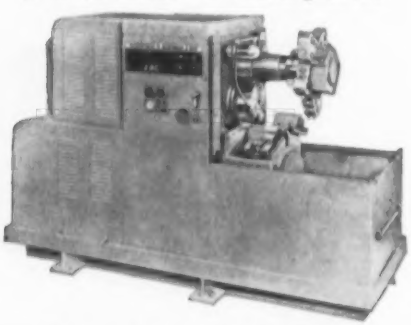
abrasive discs

BELOIT, WISCONSIN

WARNER & SWASEY AUTOMATICS

slash machining time on 50 to 350 piece lots

1 AC CHUCKING MACHINE
8″ or 10″ Chuck — 6″ Working Stroke



2 AC CHUCKING MACHINE
10″ or 12″ Chuck — 9″ Working Stroke

THE YALE & TOWNE MANUFACTURING COMPANY, Philadelphia, machine 64,000 different parts, on a two-month cycle, for their five models of industrial lift trucks. They installed two Warner & Swasey 2 AC Single Spindle Automatics to step up production on a wide variety of small lot parts. Lot sizes range from 50 to 350 pieces.

They quickly realized the expected production increase, plus more efficient use of manpower, since one operator can easily handle both automatics.

They selected Warner & Swasey 2 AC's for the job because these machines give them the advantage of automatic production *without* the usual penalties of greatly

YOU CAN PRODUCE IT

increased setup time. Their setup time is just a small fraction more than on turret lathes.

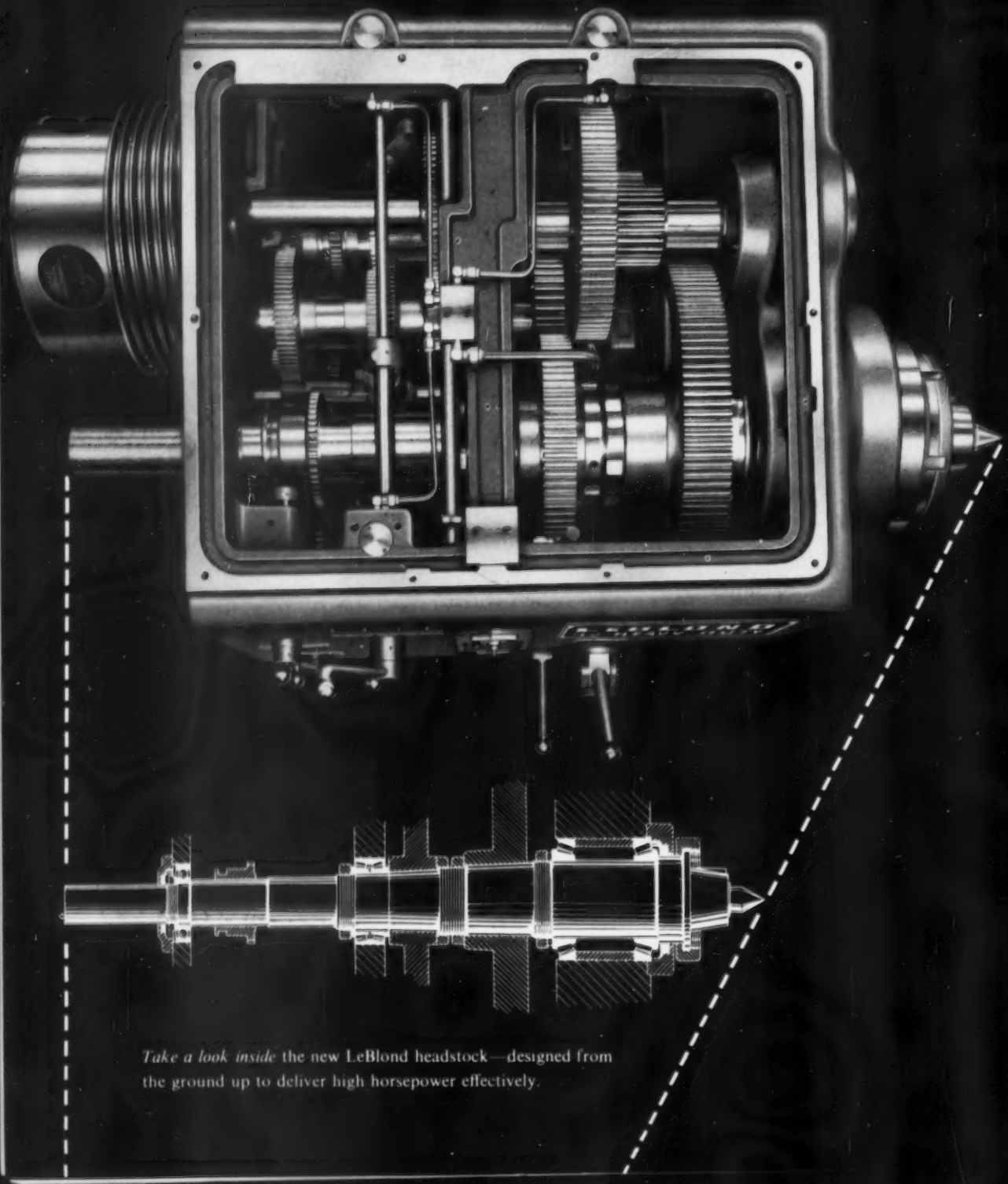
"Another big advantage we had not fully anticipated," they report, "is the interchangeability of tools. The very accessible tooling area and the use of many standard turret lathe tools are valuable features of these automatics."

There are undoubtedly many small lot, "turret lathe" jobs in your own plant that could be machined faster, more profitably and with extreme accuracy on Warner & Swasey Single Spindle Automatics. Have your Warner & Swasey Field Representative show you how these machines' flexibility and fast setup can pay off for you.

WARNER & SWASEY
Cleveland
PRECISION MACHINERY SINCE 1880

BETTER, FASTER, FOR LESS...WITH A WARNER & SWASEY

Designing LeBlond lathes for



Take a look inside the new LeBlond headstock—designed from the ground up to deliver high horsepower effectively.

60·HP turning was an inside job

This new headstock is the power secret of the LeBlond 32" Heavy Duty.

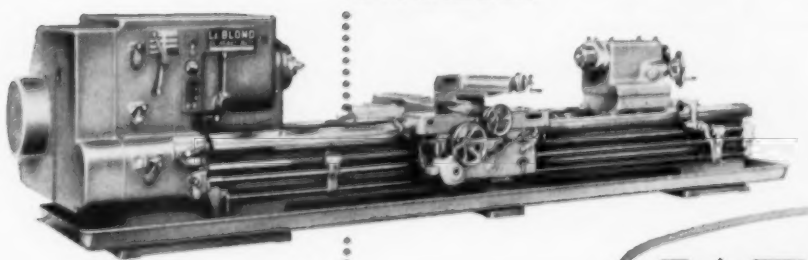
Notice how short and heavy the shafts are—to minimize deflection. Look at the fine-pitched, wide gears—for better tooth action and greater load-carrying capacity. They're hardened and ground for all speeds except low back gear. Free-running spur gear design assures minimum no-load friction horsepower. Shafts and gears not needed for a given speed remain idle, do not consume any power. The new 4-bearing spindle gives maximum rigidity, has twin Timkens at front, double-row Timken at center, ball bearing at rear.

Of all the lathes in the world, the LeBlond 32" Heavy Duty was selected by a leading manufacturer of carbide tools, to be modified for grueling laboratory tests. Using 125 hp drive, cuts were made with a measured 118 hp at the tool—*210 cubic inches of SAE 1045 removed per minute!*

Results like this call for a machine built in every detail for high-horsepower turning. The new headstock design is typical of the engineering in every element of the new LeBlond 32" Heavy Duty. The totally-enclosed quick change box, the hardened rack, 4-directional power rapid traverse, hardened and ground steel bedways, thrust-lock tailstock.

Whatever your turning needs—high power or high production, small swing or large—LeBlond makes a lathe you can trust with the job. 76 different models to choose from. Today, see your LeBlond Distributor or write—

36 speeds, new adjustable acceleration. From 4.5 to 500 rpm. New and exclusive adjustable acceleration brings heavy work pieces up to speed safely; any percentage of full torque can be selected for the first five seconds. Similar adjustments can be made for stopping and jogging, by means of three rheostatic controls to the electric clutch and electric brake. Hydra-Trace duplicating attachment optional. Write for Bulletin HD-165 for full details.



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THE R. K. LEBLOND MACHINE TOOL COMPANY, CINCINNATI 8, OHIO

WORLD'S LARGEST BUILDER OF A COMPLETE LINE OF LATHES • *FOR MORE THAN 69 YEARS*

how's this for

BUILT-IN "AUTOMATION"? ..

(6 broaching operations performed on one machine!)

With all the talk that's going the rounds about automation, you might want to take a look at the multiple broaching operations being performed on this 9mm. automatic revolver barrel — in the plant of one of the country's most prominent makers of high-grade firearms.

Six operations are performed at one time, resulting in the production of 80 completely broached barrels per hour (at 80% efficiency)!

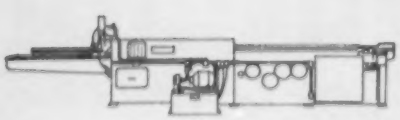
Do you think it paid off, for this revolver maker to convert to Lapointe Broaching? Examine the list of operations, shown below the photographs, and decide for yourself . . . (it won't take you long!) Then, think of some of the operations you are now performing in your plant, and see how easy it would be for you to *lower your own costs through conversion to Lapointe Broaching.* On request, a qualified Lapointe field engineer will gladly discuss the subject with you.

THE LAPOINTE MACHINE TOOL COMPANY

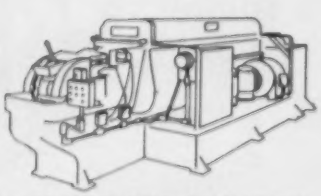
HUDSON, MASSACHUSETTS • U.S.A. *In England: Watford, Hertfordshire*

THE WORLD'S OLDEST AND LARGEST MANUFACTURERS OF BROACHING MACHINES AND BROACHES

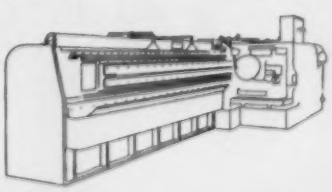
Here's a line of ELECTRO-MOTIVE DRIVE BROACHING MACHINES . . . . . available only at LAPOINTE



60° STROKE HORIZONTAL, ELECTRIC

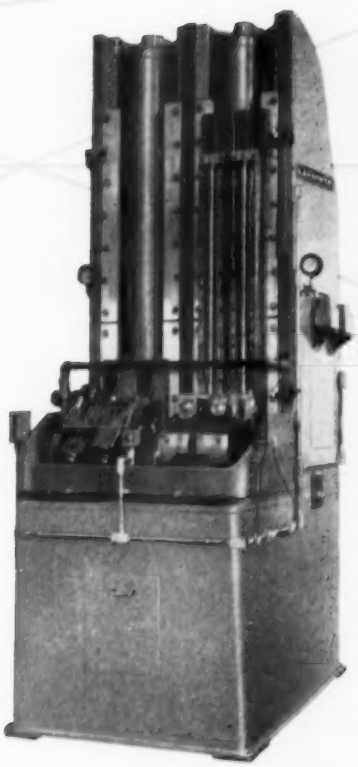


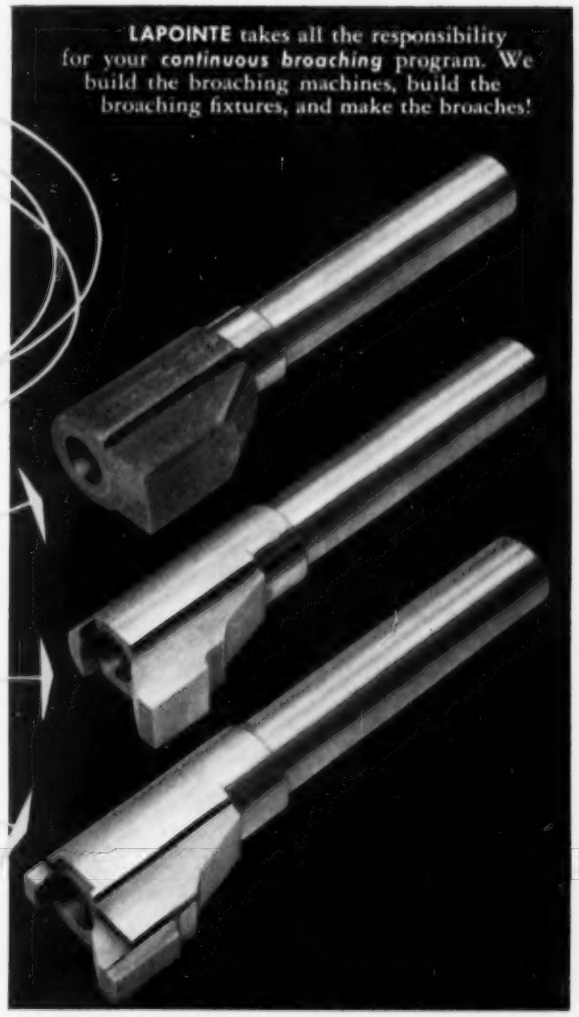
CH CONTINUOUS BROACHING, ELECTRIC



SRHE SINGLE RAM HORIZONTAL, ELECTRIC

. . . . . in LAPOINTE BROACHING

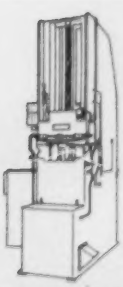




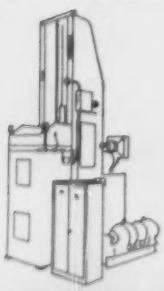
LAPOINTE takes all the responsibility for your ***continuous broaching*** program. We build the broaching machines, build the broaching fixtures, and make the broaches!

Operations: Broach half-round and adjacent parallel sides lengthwise; broach bottom contour crosswise; straddle-broach bottom lengthwise, and straddle-broach end in same pass, part being indexed 90° mid-way of the cutting stroke; broach slot at an angle across the end. Special mid-stroke indexing of part in the fixture at this point permits two cuts to be made at right angles to each other without removing the part from its nest. Part is broached from rough contour steel forging.

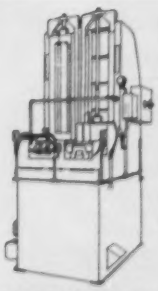
Machine is Lapointe 10-ton 66-inch stroke Double Ram Vertical Surface Broaching Machine, with two operations assigned to each Tip-Down Table (Lapointe patent).



VUE-7 VERTICAL PULL-UP ELECTRIC



SRVE SINGLE RAM VERTICAL, ELECTRIC



DRVE DOUBLE RAM VERTICAL, ELECTRIC

LAPOINTE

known to be the best in

BROACHING

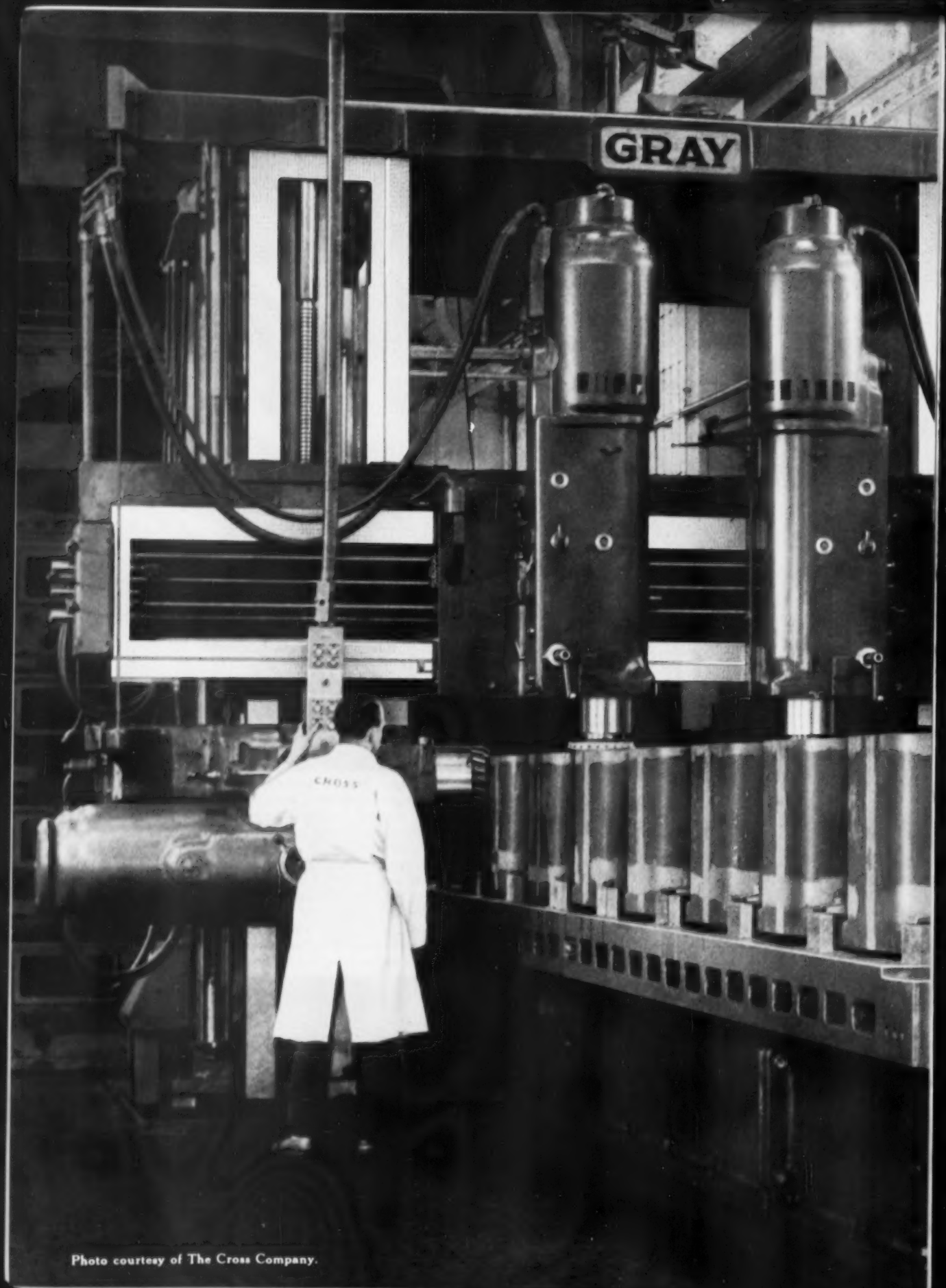
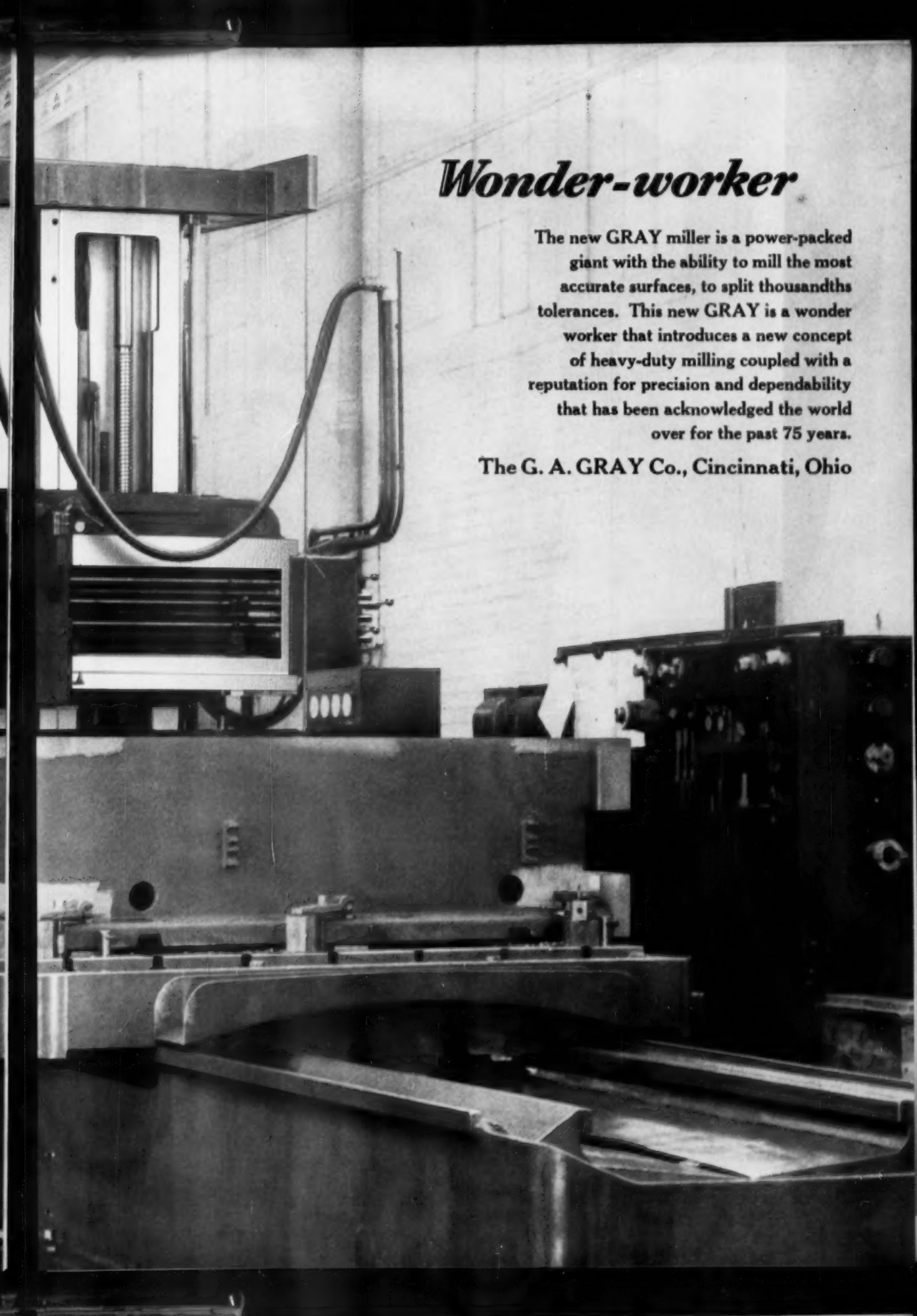


Photo courtesy of The Cross Company.

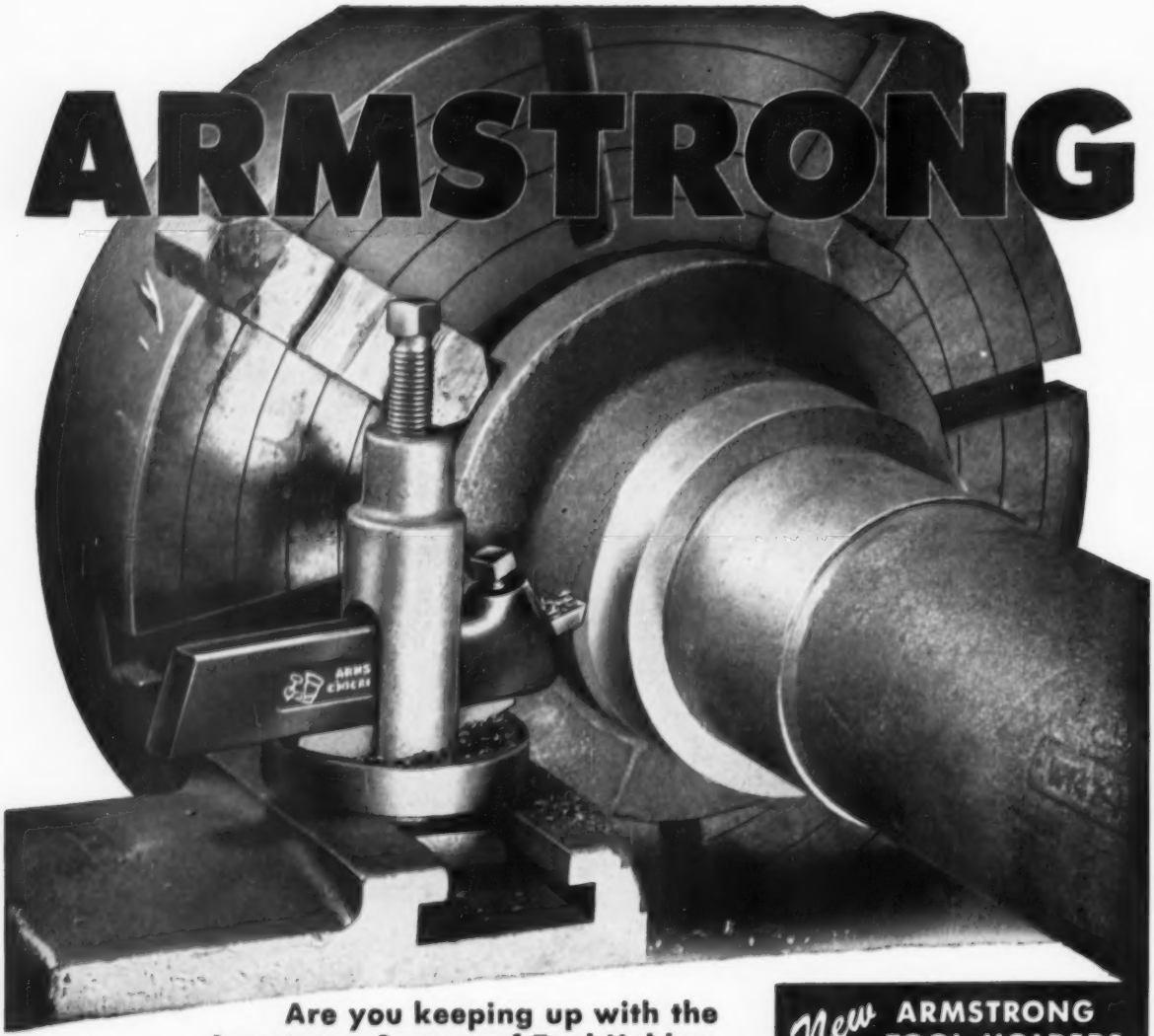


Wonder-worker

The new GRAY miller is a power-packed giant with the ability to mill the most accurate surfaces, to split thousandths tolerances. This new GRAY is a wonder worker that introduces a new concept of heavy-duty milling coupled with a reputation for precision and dependability that has been acknowledged the world over for the past 75 years.

The G. A. GRAY Co., Cincinnati, Ohio

ARMSTRONG



Are you keeping up with the Armstrong System of Tool Holders

Doubtless you are daily using ARMSTRONG TOOL HOLDERS that have been in continuous operation for many years. This is sound practice, for this means added profits without added tool costs. But to become complacent, so satisfied that you forget your ARMSTRONG TOOL HOLDERS, is unwise. The "Armstrong System" is a growing thing, with new types and sizes of ARMSTRONG TOOL HOLDERS constantly being developed to more effectively meet new machining conditions, or to take advantage of newly developed cutting materials.

With modern ARMSTRONG TOOL HOLDERS for each operation, you can greatly increase speeds and feeds. You can lower machining cost and further increase profits.

If you haven't kept up with the "Armstrong System" write for an ARMSTRONG Catalog and check to see that you are using the most efficient ARMSTRONG TOOL HOLDER for each operation on all lathes, planers, slotters and shapers.

WRITE FOR CATALOG

New ARMSTRONG TOOL HOLDERS
ARMSTRONG Spring Form Threading Tool Holder
ARMSTRONG Spring Cutting-off Tools
ARMSTRONG Carbide Tool Holders for Carbide-Tipped Cutters
ARMSTRONG "C-A" Tool Holders for ARMALOY (Cast-Alloy) Cutter-Bits

ARMSTRONG BROS. TOOL CO. *"The Tool Holder People"* 5215 W. ARMSTRONG AVENUE CHICAGO 30, ILL

Three for thrift!

Norton cut-off wheels . . . fast, safe and long lasting . . . bring you the profit-boosting "TOUCH of GOLD"

Norton has brought cut-off wheel development to the point where you can be sure of fast, clean cutting action, low rate of wear and a wide safety margin on every job.

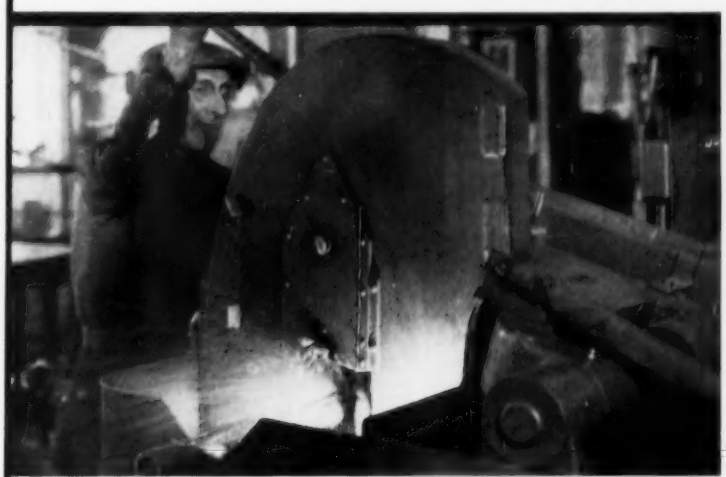
That goes for all metals, from softest to hardest — for non-metals ranging from rubber hose to marble — and for any type of machine, high speed or low speed, swing frame, chopper, traverse, floor stand or portable.

Three of the most popular Norton cut-off wheels are shown here. See your Norton Distributor for practical help in wheel selection and facts on dry vs. wet methods for your cutting-off operations. Or write to the nearest District Office of NORTON COMPANY, Worcester 6, Mass. Distributors in all industrial areas, listed under "Grinding Wheels" in your phone book, yellow pages. Behr-Manning Company, Troy, N. Y., division of Norton Company. *Export:* Norton Behr-Manning Overseas Incorporated, Worcester 6, Massachusetts.

W-1704

B9 RESINOID CUT-OFF WHEEL

The B9 is an ideal high production wheel, adaptable to speeds up to 16,000 sfpm. Available with either smooth sides, or with the rougher "F" sides for greater chip clearance. An exceptional performer on both ferrous and non-ferrous metals. For dry cutting only.



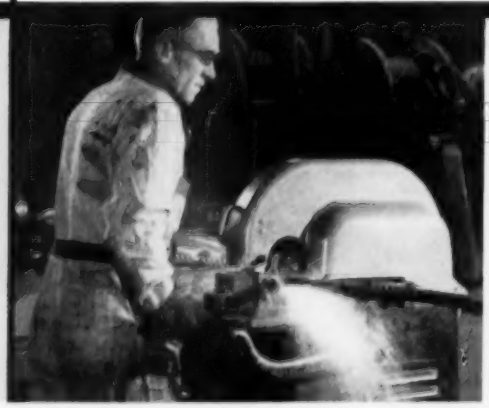
R50 RUBBER CUT-OFF WHEEL

Designed primarily for wet-cutting metal bar stock, the Norton R50 rubber bonded wheel handles diameters up to 6". Built-in chip clearance — unusual in this type of wheel — is an advantage for freer, cooler cutting with minimum burr and without case hardening the work. Can also be used for dry cutting.

NORTON ABRASIVES

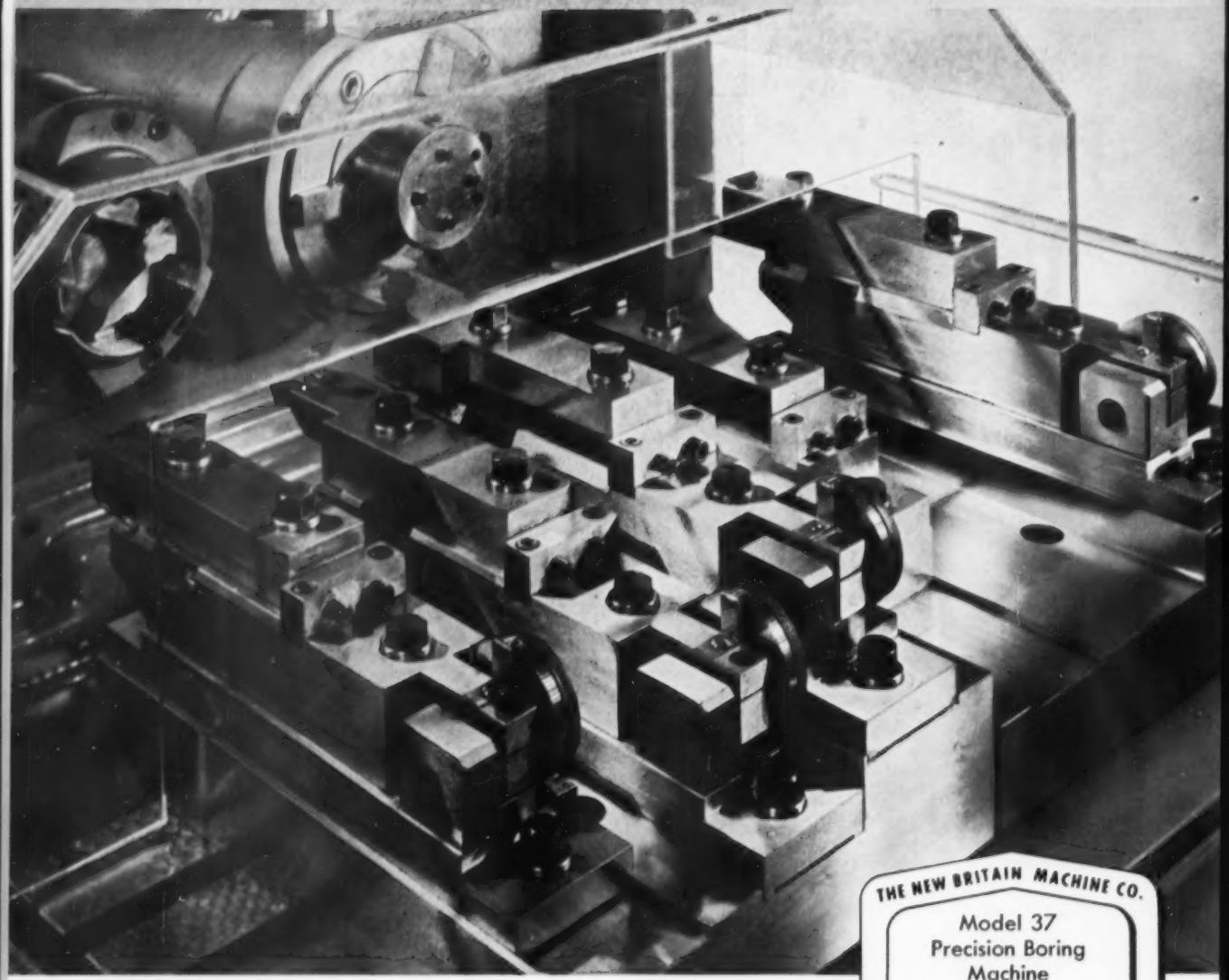
Making better products . . . to make your products better

NORTON PRODUCTS: Abrasives • Grinding Wheels
Grinding Machines • Refractories
BEHR-MANNING PRODUCTS: Coated Abrasives
Sharpening Stones • Behr-Cut Tapes



BN RESINOID CUT-OFF WHEEL

Extra strength and safety, plus knurled sides for more effective cutting action, make the reinforced, resinoid bonded BN wheel a great favorite for the widest range of jobs, especially non-ferrous operations. Other uses include: cutting wire rope; slotting railway track welds; tuck pointing; cutting fibre board, concrete, tile, plastics, and the like.



THE NEW BRITAIN MACHINE CO.

Model 37
Precision Boring
Machine

NB

your most solid investment in precision boring machines

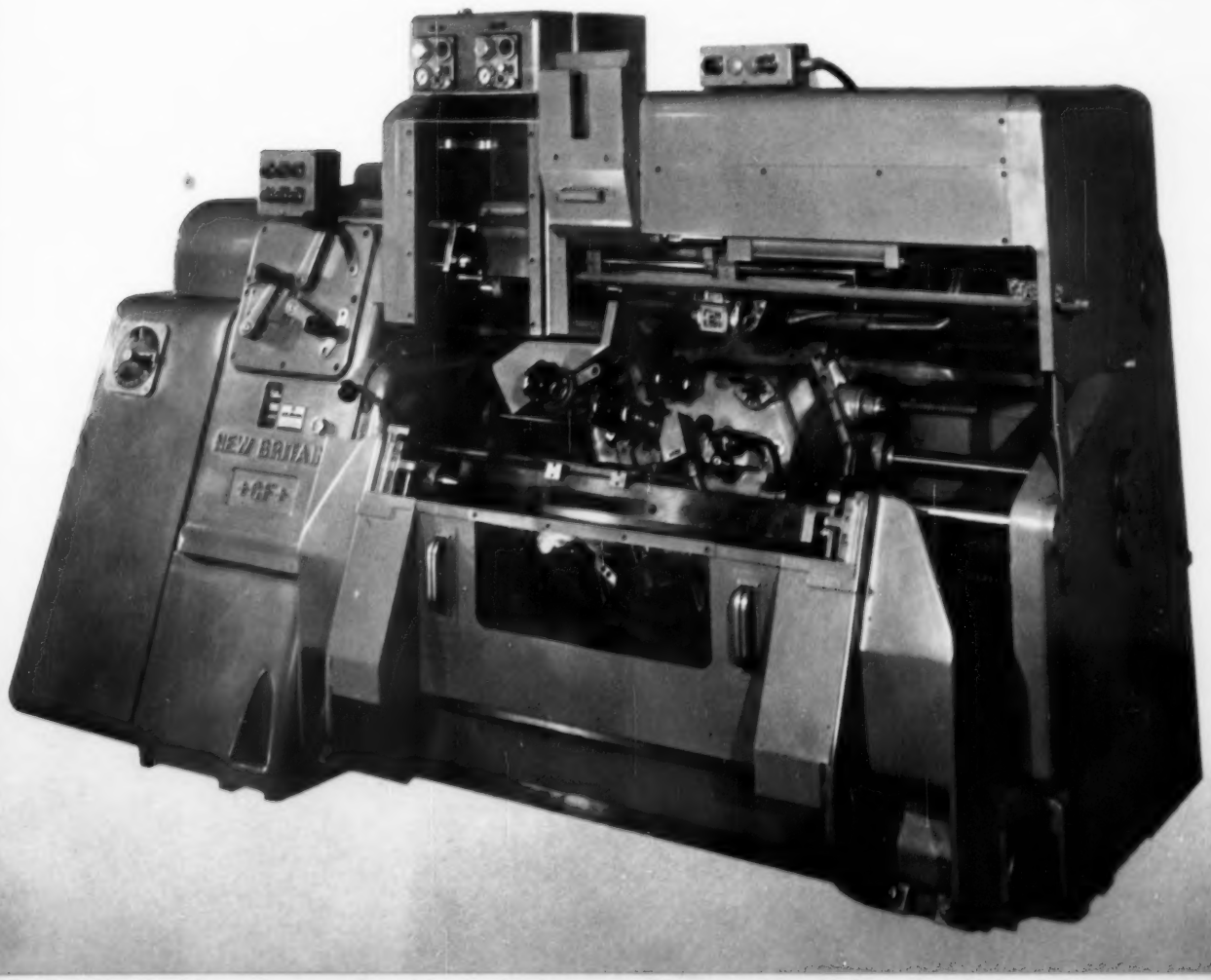
New Britain boring machines employ super-precision spindles and positive cam control of all tool paths. Both the spindles and the cam shaft are solidly mounted to the rugged frame to protect the original high accuracy for the life of the machine.

Available with either single or multiple spindles. Hopper feed, automatic gauging and tool resetting may be added. The New Britain Machine Company, New Britain-Gridley Machine Division, New Britain, Connecticut.

old methods can't compete

If you do *any* turning you should investigate the New Britain **+GF+** line of copy turning lathes—whether your work calls for sustained production or short runs demanding quick setups. It turns tapers and complicated contours with the same setup used for simple O.D.'s. No need for expensive form tools. Let us demonstrate this completely different approach to turning in a color motion picture demonstration at your desk.

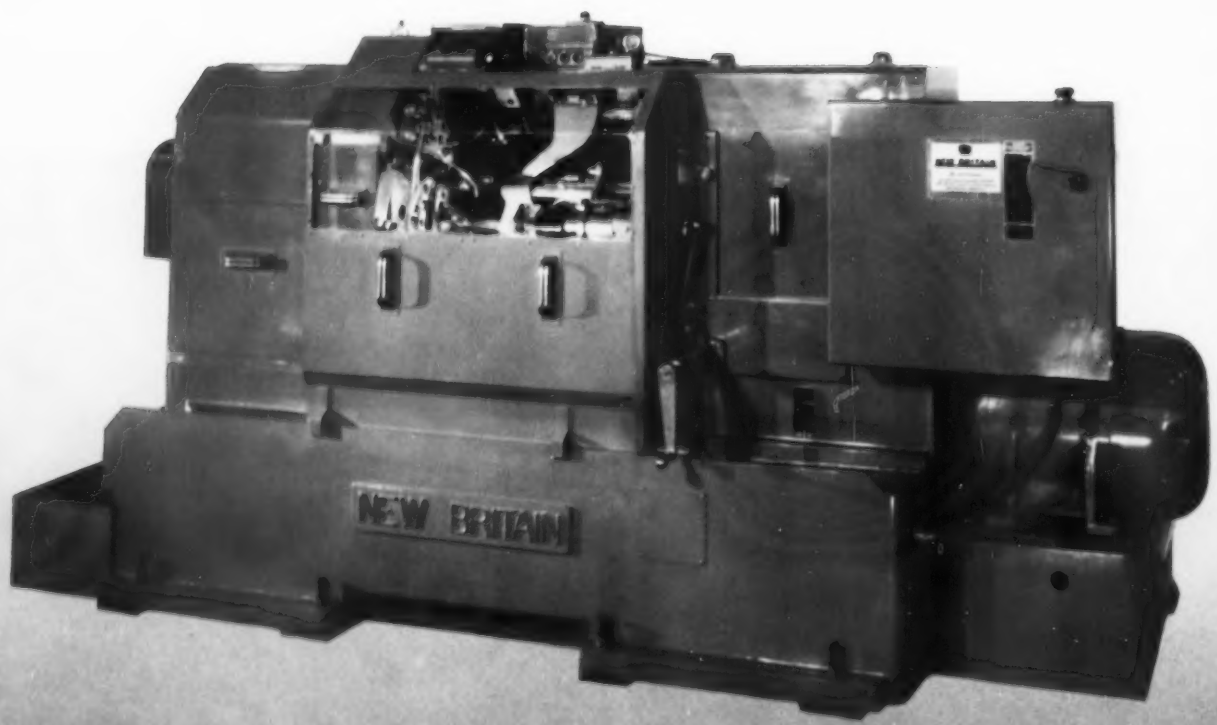
THE NEW BRITAIN MACHINE CO.
Model 11/70
New Britain +GF+
Copying Lathe
NB

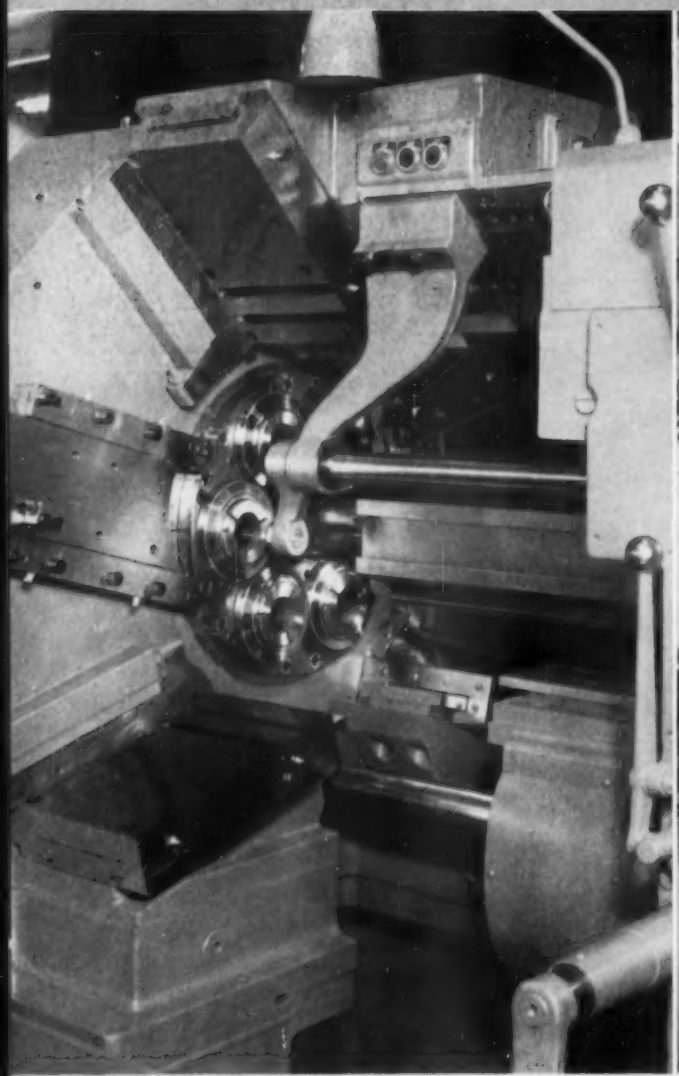


a long new step forward
in bar machine productivity

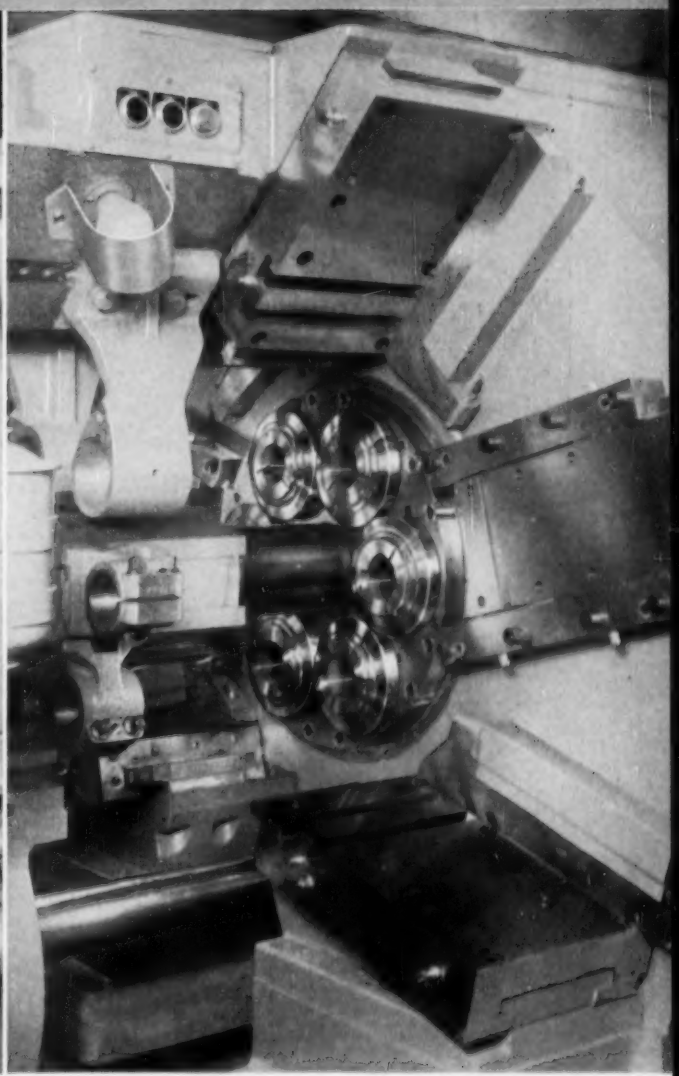
THE NEW BRITAIN MACHINE CO.
Model 62
Automatic Bar
Machine
NB

Here is a new New Britain bar machine with the ruggedness, power, speed and versatility to shed new light on your profit picture. Where you have bar work that now requires more than one machine, it may be practical to eliminate costly finishing operations by doing the whole job on a New Britain Model 62. Ask your New Britain representative or write The New Britain Machine Company, New Britain-Gridley Machine Division, New Britain, Connecticut.





Tooling area, front of Model 62



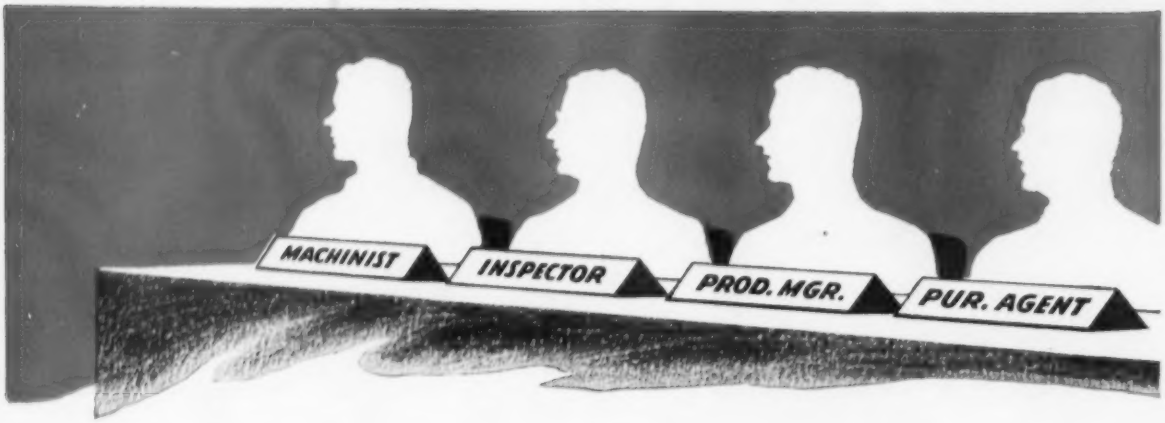
Tooling area, back of Model 62

This new automatic combines the most important features for which New Britains are noted, with many basic improvements:

- Spindle carrier lifting to eliminate wear.
- Carrier locating and locking for uniform accuracy and rigidity.
- Spherical roller collet closing mechanism.
- Automatic stop.
- More efficient spindle spacing.
- An independent cross slide in every position.
- Maximum tool clearance.
- Improved accessibility to tooling area and cutting tools.

The NEW BRITAIN MACHINE COMPANY

New Britain-Gridley Machine Division, New Britain, Connecticut



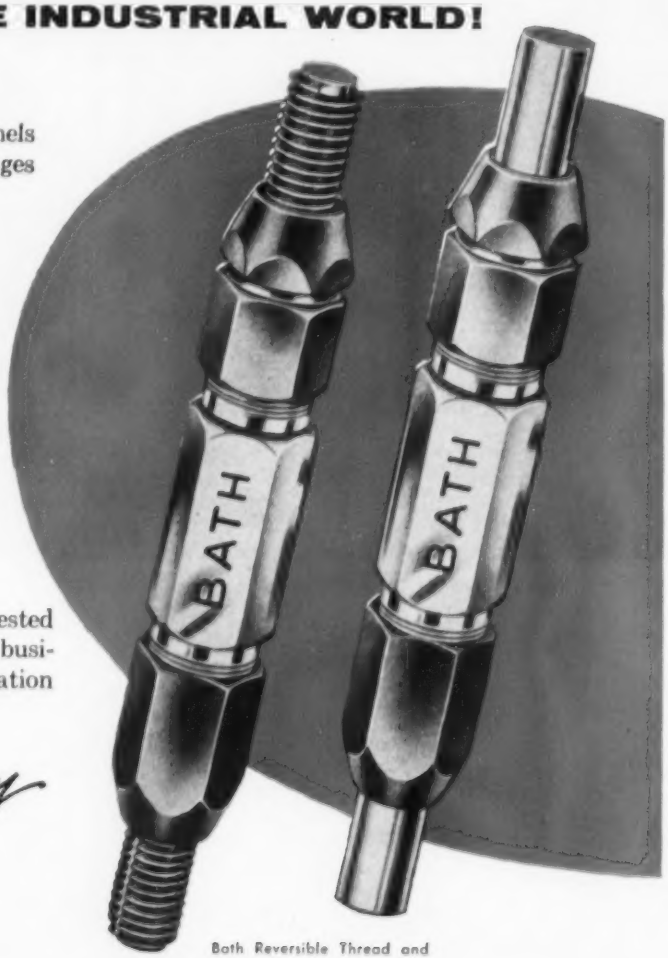
THE MOST IMPORTANT PANEL IN THE INDUSTRIAL WORLD!

This is no secret — industrial panels know that it pays to use Bath Gages because

- — the quality is tops
- — the measure is accurate
- — the wear-life is long
- — the price is right
- — expert Bath engineering service is available
- — they are made to American Gage Design Standards
- — they meet Federal and Military specifications.

If the members of your panel are interested in "what's our line" . . . an inquiry on business stationery will bring full information about Bath Products.

for the best buy ...buy Bath

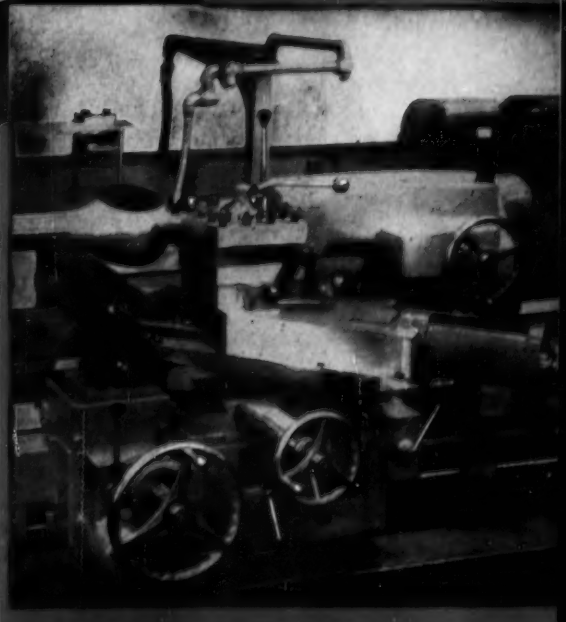


Bath Reversible Thread and Reversible Cylindrical Plug Gages

JOHN BATH & CO., Inc.
22 Grafton St., Worcester, Mass.

CYLINDRICAL AND THREAD GAGES · GROUND THREAD TAPS · INTERNAL MICROMETERS

2 hrs. — versus 9½ hrs.



This marine Diesel engine connecting rod is now roughed and finished from the rough forging in exactly 2 hours. It formerly required 9½ hours to do the same job.

With production costs constantly reaching new peaks, industry simply can't afford to ignore such savings from modern equipment. Where else could such a magnificent return upon an investment be secured, and how else can costs be lowered to meet an increasingly competitive market?

More production per man hour is the answer and the only answer to prohibitive costs—modern, high production machinery is the answer to greater production per man hour.

The astounding saving on this connecting rod job is the result of transferring it from previous equipment to a new 32-inch "AMERICAN" Hydraulic Duplicating Lathe. Such savings as this are not the exception but the rule when "AMERICAN" Duplicators are put on the job.

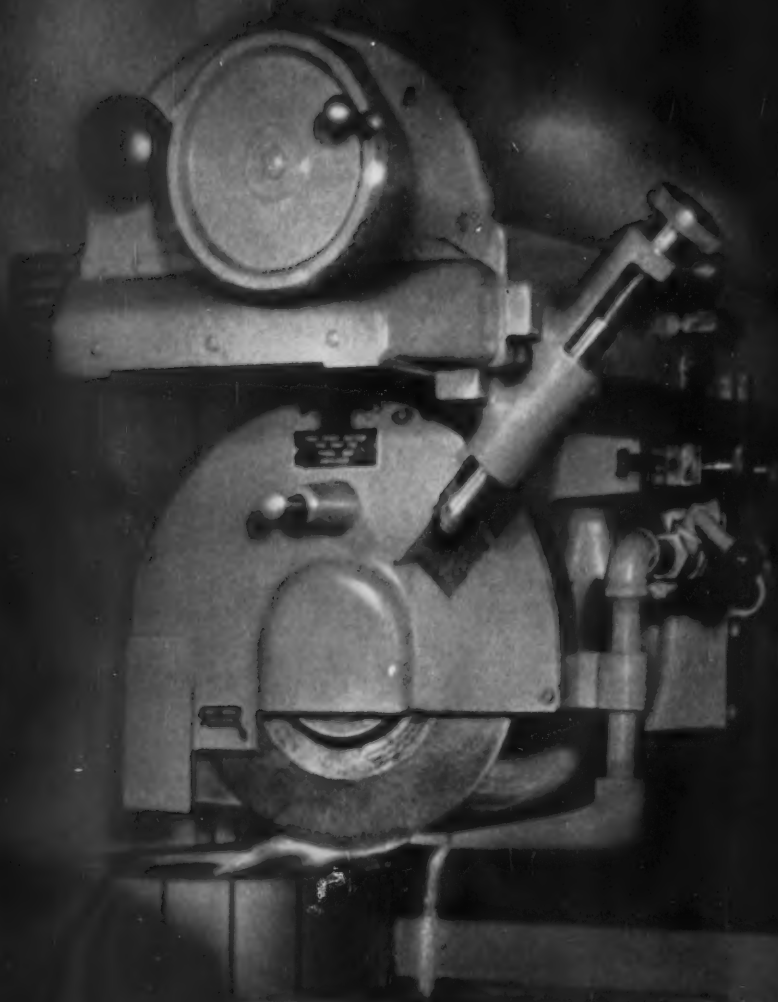
Bulletin No. 35 shows many such examples—it's yours for the asking.

THE AMERICAN TOOL WORKS CO. **Cincinnati, Ohio U.S.A.**

Lathes and Radial Drills

WORLD'S MOST COMPLETE LINE

# of hydraulic surface grinders



invites your attention...

name the surface grinding job. . . Thompson has the machine

Thompson Type B

Surface dies or parts faster to part print, at lower cost, within wide size range

work size

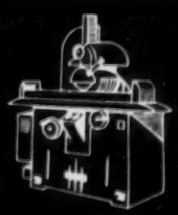
6″ x 18″
to
12″ x 120″

Thompson Type F

For greatest precision, sensitivity and versatility in toolroom. . . or parts production at low cost

work size

8″ x 18″
and
8″ x 24″



Thompson Type C

Meets production and cost demands in larger size surface work of all types

work size

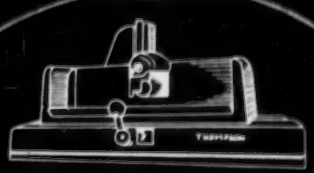
12″ x 40″
to
24″ x 168″

Thompson Type CX

Offers both power and precision for heavy duty production. . . fast, accurate

work size

30″ x 72″
to
36″ x 240″



Thompson SURFACE Grinders

Including a complete line of Truform, Hydrail, Hydrovert, Twin Rotary and other special grinders for all sizes and types of work.

write for descriptive data

THE THOMPSON GRINDER COMPANY

SPRINGFIELD, OHIO

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Any steel bar you need . . .

STAINLESS · ALLOY · COLD FINISHED

Keeping a big stock of steel bars in various types, grades and sizes—in stainless, alloy and cold finished steels is a mighty big expense. *And*, there's no need for it. All U.S. Steel Supply warehouses, located from coast to coast, carry a complete line of bars ready and waiting for your call. When you order steel from us, you get it fast—without delay. Why not make our warehouse your warehouse and let us carry the expense of big inventory.

U.S. Steel Supply warehouses also carry big stocks of sheet, strip, plate, shapes, tubular products, bars, expanded metal, etc.—in stainless, and carbon and alloy steels. One order can cover all your steel requirements—and we will be glad to help you select the best steel for the job. Call your local U.S. Steel Supply salesman.

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UNITED STATES STEEL

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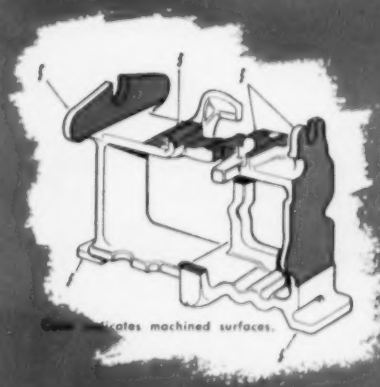
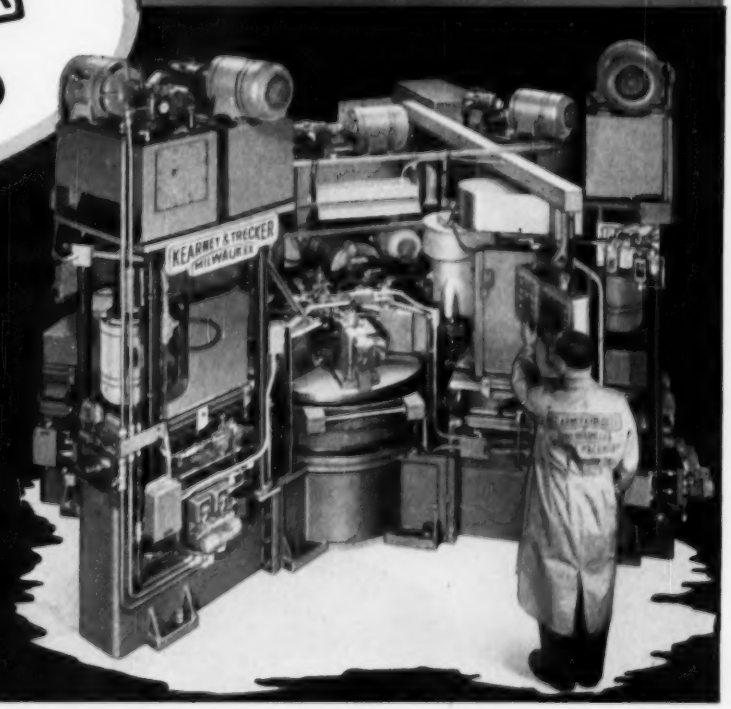
CUSTOMER SPECIFIED

One of the nation's leading manufacturers of communications equipment needed a way to increase production milling of telephone relay frames, reduce unit costs and greatly improve product quality. They called on Kearney & Trecker to solve this problem.



Cross-hatching indicates machined surfaces.

KEARNEY & TRECKER MILWAUKEE® DESIGNED



Here's Kearney & Trecker's answer: Two 6-Station Rotary Indexing machines which mill 24 surfaces on cast iron telephone relay frames within plus or minus .002" at a combined rate of 360 pieces per hour. Former methods produced only 150 relay frames per hour.

An important cost-saving feature of each machine is the application of standard units — five feed slides and a 48" rotary index table. Such utilization of standard units lowered initial costs, simplified maintenance and increased efficiency.

High-volume, low-cost production starts with Kearney & Trecker Milwaukee machine tools

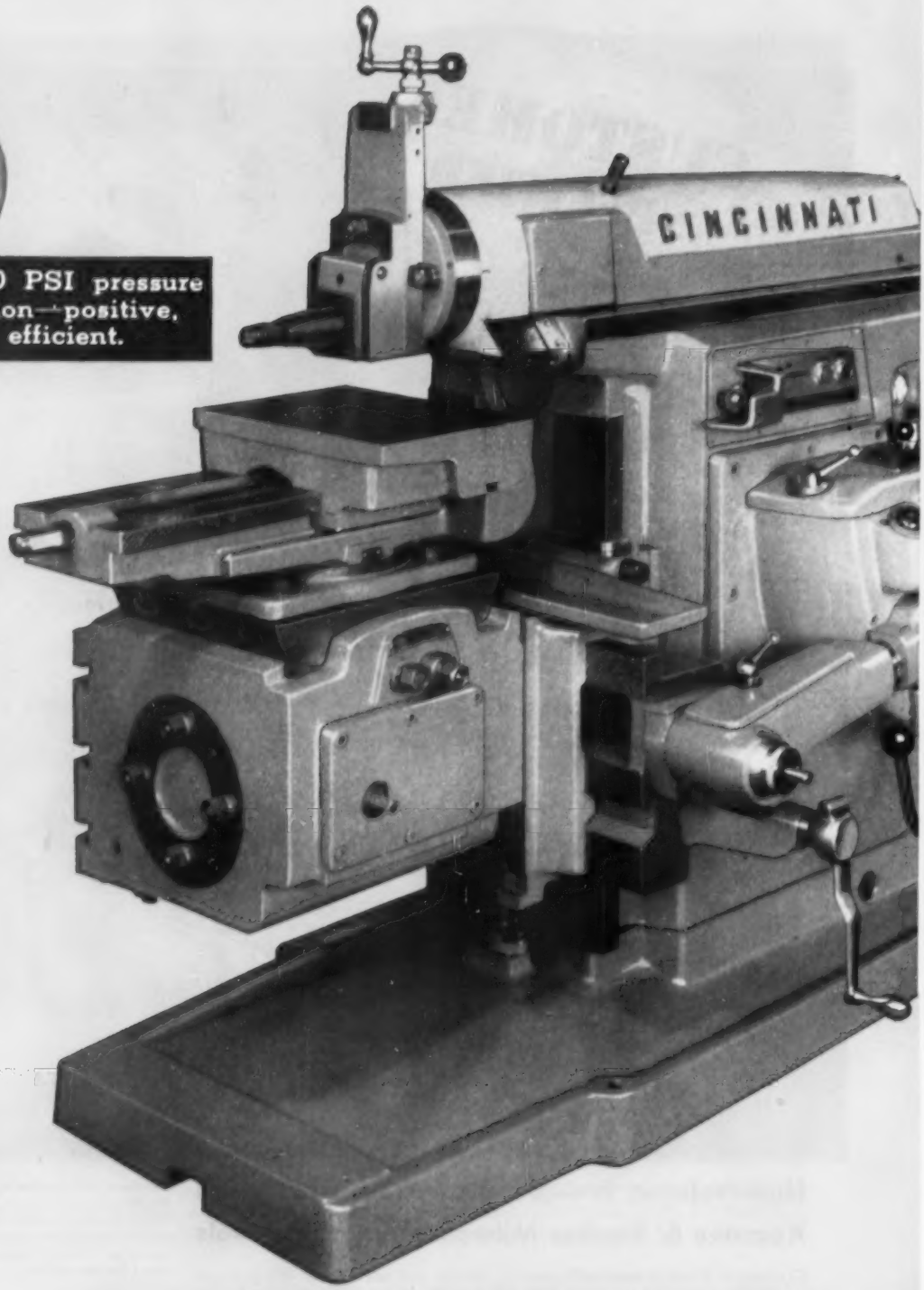
Kearney & Trecker automatic production machines accurately perform many operations at lower cost. But most important to you, this is accomplished by combining standard design components — feed slides, way-type drill units, tapping units, quill feed units, rotary index tables — that keep initial machine costs at a minimum. You get the production you want and the economies you need from job-proven designs. What's more, you get performance to exacting accuracies.

Take advantage of our abilities. See how they can pay off in new profits for you. Whatever your production machine needs, call our representative or write: Special Machinery Division, Kearney & Trecker Corp., 6786 W. National Ave., Milwaukee 14, Wisconsin.

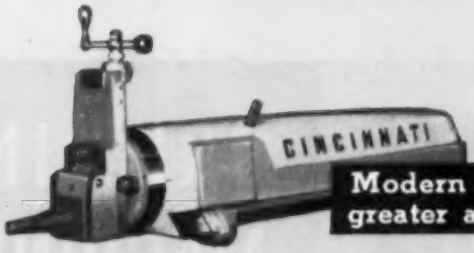
For more information on machine illustrated, ask for Data Sheet No. 1083. A new bulletin, SMD-56, which describes many of our outstanding machine designs, is also yours for the asking.

Designers and Builders of Precision and Production Machine Tools Since 1898

Modern 50 PSI pressure lubrication—positive, safe, efficient.



Modern brushless electro-magnetic brake and clutch—no adjustment required.



Modern nodular iron slot-free ram for greater accuracy.

CINCINNATI RIGID SHAPERS

Rigidity thru advanced design of column, ram, vise and trunion permit smooth heavy cuts on these modern Cincinnati Rigid Shapers.

The most modern controls and oiling system give speedy performance and easy and positive operator control.

Furnished in 16″ to 36″ capacities.

WRITE FOR THE NEW DESCRIPTIVE BULLETIN.

THE CINCINNATI SHAPER CO.

CINCINNATI 25, OHIO, U.S.A. SHAPERS • SHEARS • BRAKES

CINCINNATI

CLEEREMAN DRILLING MACHINES

LOWEST Operating Costs!

Why?

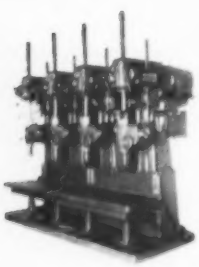
1—Eliminate Down Time.

2—More Power to Produce.

3—Lowest Maintenance Costs.

4—Less Operator Fatigue.

Go to any Cleereman user for proof.



Cleereman Gang Drilling Machine.

Cleereman Round Column Drilling Machine.

Cleereman Box Column Drilling Machine.

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CLEEREMAN MACHINE TOOL CORP., Green Bay, Wis.

"We've tried them all and . . . only one meets our standard of quality . . . USS Galvanized Steel Sheets,"

says **Mr. Anthony Piccininni,** shop foreman,
Arrow Conduit & Fittings Corporation, Brooklyn, New York

"Only the best material available goes into Arrow Conduit products," continues Mr. Piccininni. "The men take pride in their finished work. Because of the extreme forming operation required in making our outlet boxes, the galvanized sheet must be able to withstand being drawn to a depth of three inches without peeling or cracking. We've tried them all and we find that the only one that meets our standard of quality is USS GALVANIZED STEEL SHEET."

Constant production control assures a smooth, uniform, tightly-adhering zinc coating. USS Galvanized Steel Sheets can be cut, bent, stamped, rolled, welded, soldered—without flaking, cracking, chipping.

If there is a place in your operation for galvanized steel, why not investigate the many advantages of USS Continuous Line Galvanized Steel Sheets? For more information just write or call your nearest United States Steel District Sales Office. They will be glad to help you without obligation.

Shown here ready for packing is a finished Arrow Conduit box—No. A.C. 16. In the first step of this box-forming operation, a large sheet of galvanized steel is sheared into 6" strips; next each strip is cut up into different size blanks to suit different outlets. The blanks are then fed into a press where knockouts are put into the blanks. From there the blanks are drawn to the different shapes desired . . . and this is the step which really tests the quality and ductility of the galvanized steel sheet. Additional knockouts are punched, the edges trimmed and the boxes cleaned and packed.

USS GALVANIZED STEEL SHEETS

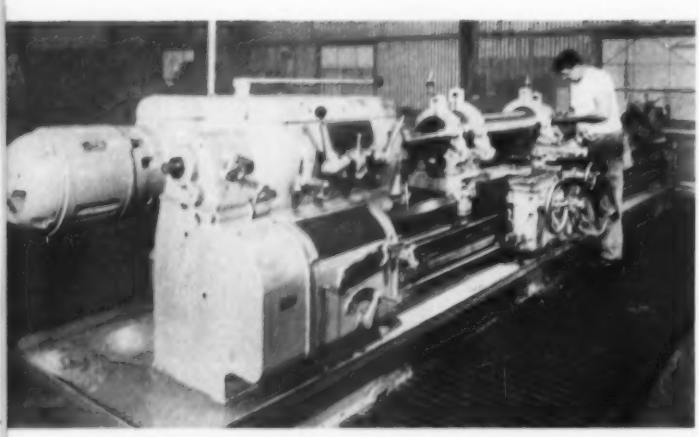
UNITED STATES STEEL CORPORATION, PITTSBURGH · COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO
TENNESSEE COAL & IRON DIVISION, FAIRFIELD, ALA.
UNITED STATES STEEL SUPPLY DIVISION, WAREHOUSE DISTRIBUTORS, COAST-TO-COAST
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

USS

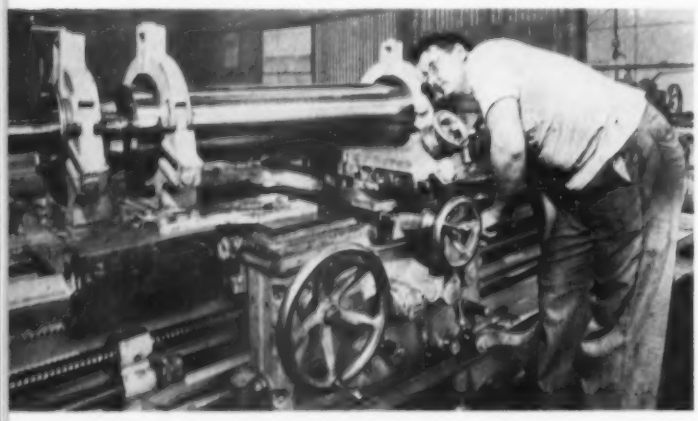
UNITED STATES STEEL

AXELSON production

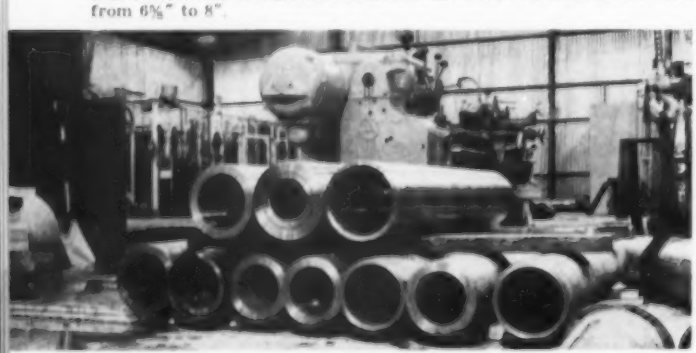
AXELSON MANUFACTURING COMPANY



Turning, boring and threading on the Axelson lathes proved faster, easier and more accurate.



Floor to floor time of 1 hour and 40 minutes includes four cuts to bore I.D. from 6⅝" to 8".



Cylinders, shown in different stages of completion, are 10" O.D., 4' long, weigh 400 lbs. before machining. Finish to 30 micro-inches r.m.s. is required for hydraulic oil well driller to operate properly under punishing conditions.

BORING TIME REDUCED FROM 2 DAYS TO LESS THAN 2 HOURS...

better surface finish, less taper, closer tolerance... on oil-well tool cylinders

The Fluidrill, a hydraulic oil-well driller produced by Directo Corporation, Houston, operates at 100 to 20,000 feet underground, where it is subjected to brutal abuse from drilling muds, heat, rock and vibration. The component parts, and most particularly the heat-treated steel cylinder, must be machined to extremely close tolerance to function properly under these exacting conditions.

Accurate four-cut boring of this 400-pound, 10-inch O.D. cylinder was a task that had required up to two days to perform, until Axelson 20" and 25" lathes were installed to do the job! Floor-to-floor time is now 1 hour and 40 minutes; further advantages are: accuracy to 0.0015 over the 4-foot length, far better surface finish, and considerably less taper.

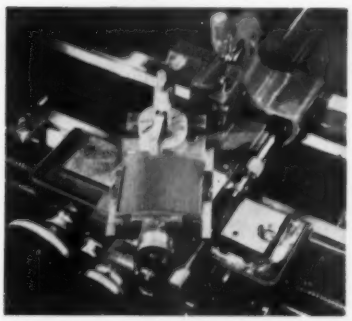
For a complete description and detailed specifications on Axelson Tool Room, Medium-Duty and the new 25/16 and 32" Heavy-Duty Lathes, write for bulletins A6-5507 and 5504.

Metal chips shown are from 4142 steel cylinders. Cut is made at feed of 0.020, speed of 265 surface ft. per minute.

Carbide cutting tool being inserted into the bar. Cylinders are accurate to 0.0015" over 4' length.

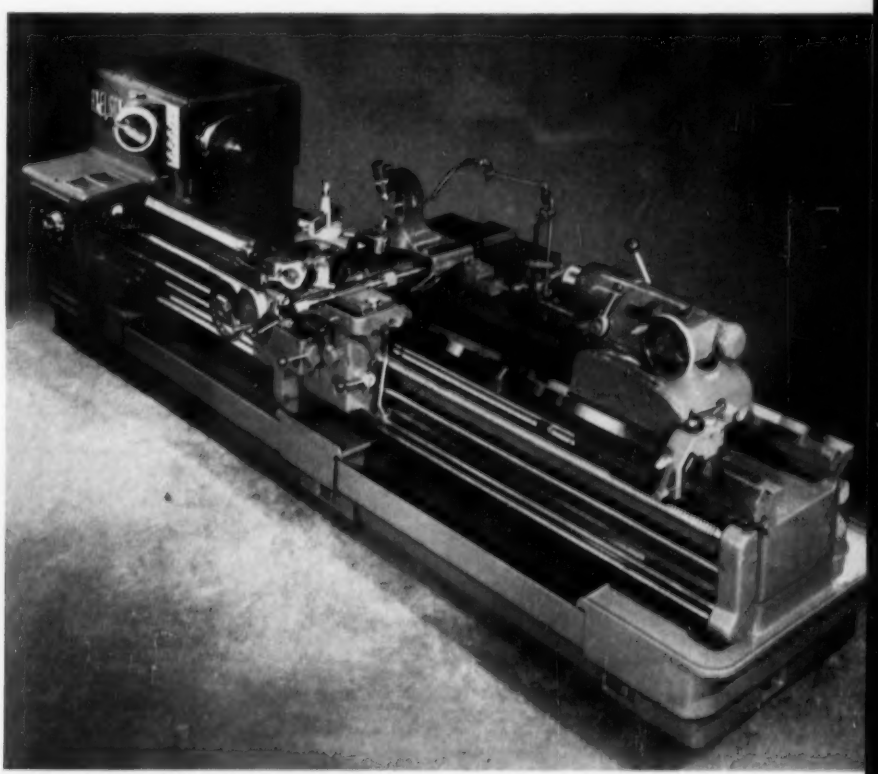
and maintenance news

DIVISION OF U. S. INDUSTRIES, INC. / 6160 SOUTH BOYLE AVENUE, LOS ANGELES 58, CALIFORNIA



Carriage and compound are designed for maximum operator convenience.

Two-speed tailstock provides fast traverse for setup work and slow spindle traverse for feeding tools held in center.



Easy controls make Axelson 25/16 lathe a flexible tool for tool room or production.

UNUSUAL FLEXIBILITY FEATURED IN 25/16 LATHE...

convenient controls simplify operation

Versatility and convenience characterize the new Axelson 25/16 Heavy-Duty Lathe, which is equally efficient for the tool room and for production. Forty horsepower is provided over range of 32 spindle speeds, from 11 to 1600 r.p.m. Speed changes are made through involute clutches. Preselective shifting is a standard feature.

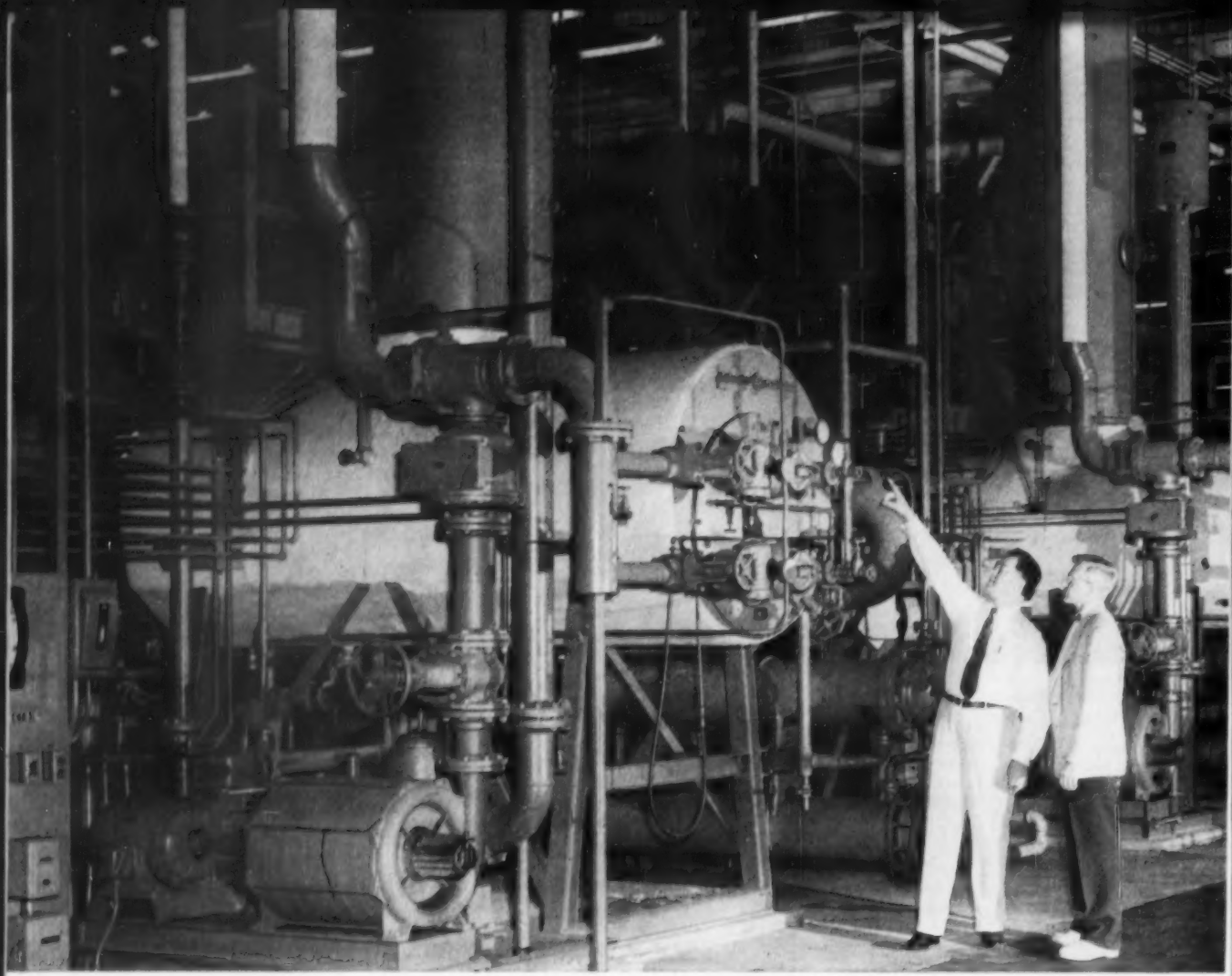
The apron, of extra-heavy, box-type construction, is completely enclosed so that all shafts, gears and bearings run in a continuous oil bath supplied by a built-in pressurized oiling system. All operating controls, including longitudinal and cross-feed, rapid traverse, head stock preselective shifting, and lead screw reverse, are conveniently controlled from the apron.

Extreme rigidity and ruggedness have been designed into all component parts. The wide bed features an exceptionally heavy girth with thick longitudinal side ribs. Center and cross ribs of equal section provide heavy-duty strength and resistance to twisting.

AXELSON

Manufacturing Company

Division of U. S. Industries, Inc.



DIFFERENT COMPOSITIONS of G-E Neutralene gas are possible to fit various applications—annealing, hardening, brazing, sintering, and carburizing. G-E gas producers shown are rated at 15,000 CFH; complete line includes ratings from 200 CFH.

CAPSULE CASE HISTORIES SHOW BENEFITS OF USING PROTECTIVE ATMOSPHERES

OXIDES REDUCED when parts are bright annealed in Exalene gas. Pan on left is shown before cleaning; center pan, after pickling only; pan on right, after bright annealing only. Exalene gas is used also in normalizing, hardening, brazing, and sintering.

SCALE-FREE UNPITTED drill chuck on right was hardened in Thermalene atmosphere, does not need subsequent cleaning; chuck on left was hardened in air. Thermalene gas is used also in bright annealing, normalizing, brazing, sintering, and carburizing.

GENERAL ELECTRIC SELLS
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HEAT PROCESSING EQUIPMENT
FURNACES • METAL-SHEATH • INDUCTION

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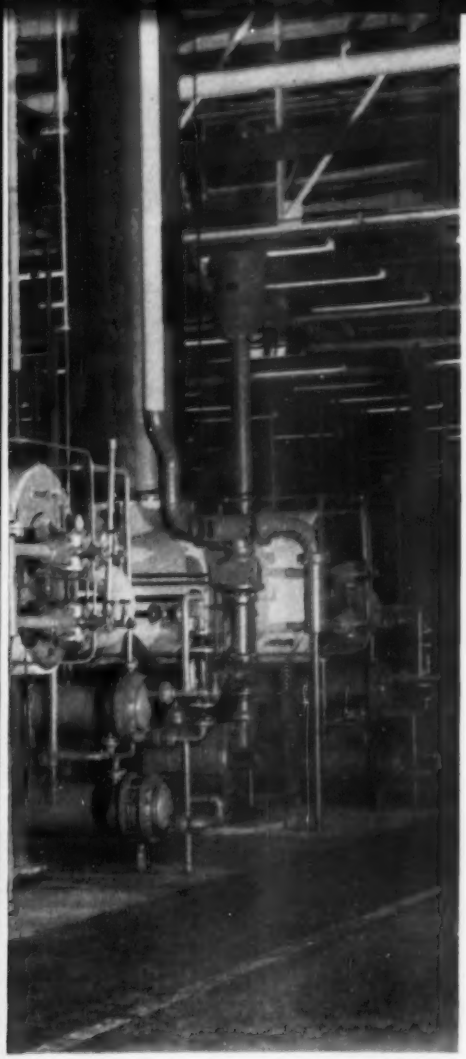

Eliminate Expensive After-work— Produce Clean Heat-treated Parts with G-E Protective Atmospheres

Protective atmospheres help you turn out heat-treated parts that are free from scale or oxides. They enable you to turn out a more salable product . . . at lower cost. This is true because pickling, grinding, machining, sandblasting, and similar operations are often made unnecessary.

General Electric offers various types and sizes of gas producers that let you manufacture atmospheres inexpensively—right in your own plant. You can prepare these atmospheres to provide exactly the right quality protection for your particular process. G-E protective atmospheres include: Exalene, an exothermic gas; Neutralene*, a CO_2-free, dry, exothermic gas; Thermalene*, an endothermic gas; Ammalene, dissociated ammonia.

Check these benefits of using protective atmospheres:

PREVENTING OXIDATION of metal surfaces during furnace heating is a primary advantage of protective atmospheres. Parts are produced at less cost and in a shorter total time cycle when scale formation is eliminated.

REDUCING OXIDES which have already formed is easily done by heating in a furnace supplied with the proper protective atmosphere. This reducing, or cleaning, is often used to prepare steel for porcelain enameling, galvanizing, or for furnace brazing.

CONTROLLING SURFACE COMPOSITION of metals in such operations as carburizing, nitriding, and prevention of decarburizing requires closely controlled furnace atmospheres.

ACCESSORY EQUIPMENT to meet specific needs is available:

Sulfur Removers take out sulfur dioxide and hydrogen sulfide where sulfur might harm the work or the furnace.

Regenerative-type Dryers remove moisture from gases. Can be had with closed-system reactivation for high-purity uses.

Refrigerated Gas Coolers remove some of the moisture from gases. These coolers may be used with regenerative-type dryers to reduce costs of preparing gases with low dew points.

COMPLETE SERVICES of your local G-E Apparatus Sales Representative include helping you to choose the most effective furnace atmosphere for your particular application . . . and to do it at lowest cost. Call him or send in coupon below for free descriptive bulletin.

*Reg. Trade-mark of General Electric Co.

CLEANING ELIMINATED when stainless steel parts are brazed in Ammalene gas. Right-hand part is shown as it came from the brazing furnace—bright and clean.

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FREE BULLETIN

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Schenectady 5, N. Y.

Please send me a copy of your bulletin, Protective Atmospheres, GEA-5907.

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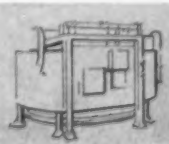
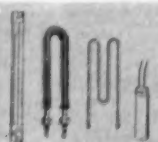
Mesh Belt



Rotary Hearth

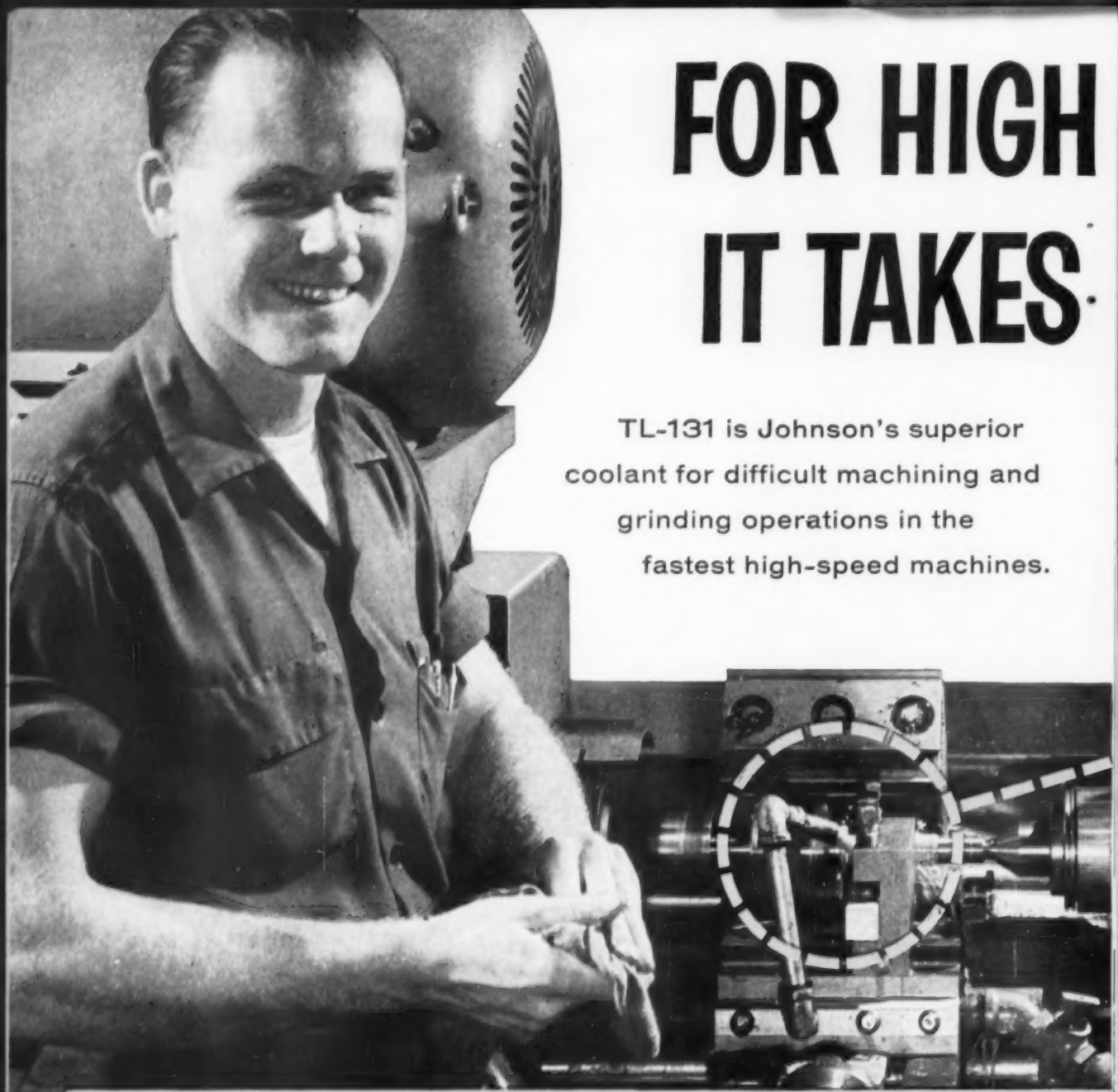
Tower

Cylindrical Bell



Metal-sheath

Electronic Induction

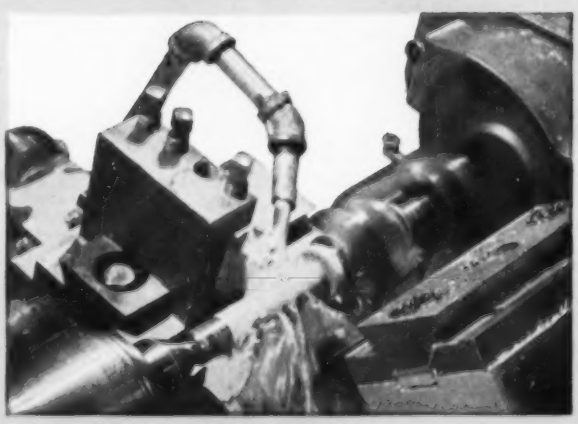


FOR HIGH
IT TAKES

TL-131 is Johnson's superior coolant for difficult machining and grinding operations in the fastest high-speed machines.

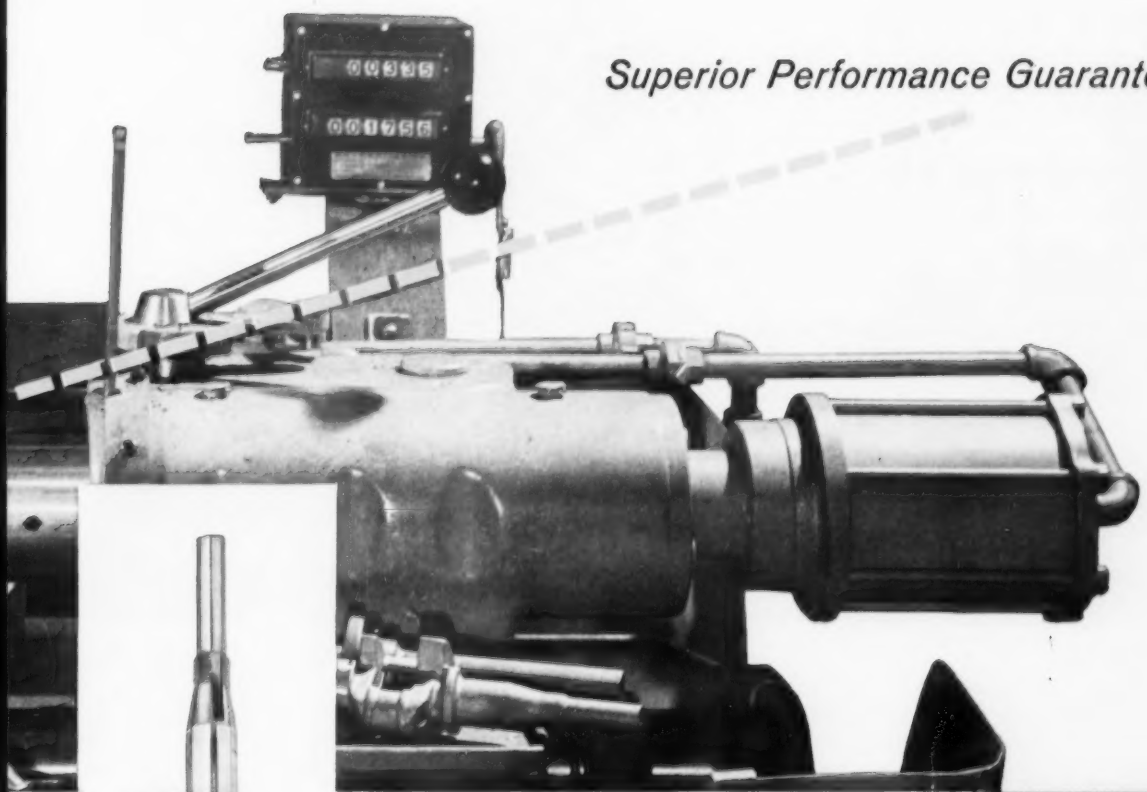
JOHNSON'S TL-131 was especially designed for cutting and grinding hard steels and for high-speed machining. Its extremely high rate of heat removal permits increased feeds and speeds impossible with conventional coolants. By preventing accumulation of destructive heat, you will find Johnson's gives you greater production, less costly downtime, longer tool life and greatly improved finishes. Also, TL-131's cleanliness and resistance to bacteria is liked by operators.

Illustrated is a Fay Automatic with a close-up of a Johnson Coolant in action. In both machining and grinding operations on the production line, Johnson's is used. This small engine crankshaft is high-carbon cast steel (40R), finished to .0004.



-SPEED MACHINING
JOHNSON'S WAX TL-131

Superior Performance Guaranteed *



*TL-131, and all Johnson's Coolants and Cutting Fluids, are sold with a written money-back guarantee. You'll get longer tool life, increased feeds and speeds in most machines, and less costly downtime. In other words, Johnson's Wax helps you get increased production from men and machines.

TL-131 J-CUT J-COOL

Try these Johnson's Wax Products on the toughest jobs in your shop. They produce superior results as claimed or the full purchase price will be refunded. For a test run, contact your local Johnson's Wax Industrial Distributor. For his name write: S. C. JOHNSON & SON, INC., Industrial Products Department, Racine, Wisconsin.

PRODUCTS OF
JOHNSON'S
WAX

16 surfaces

...on this Garrison Gear Chuck

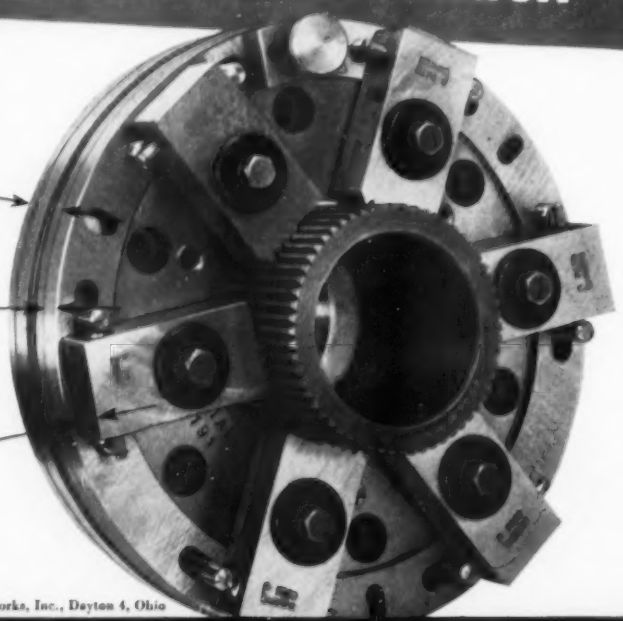


Photo courtesy of Garrison Machine Works, Inc., Dayton 4, Ohio

are Blanchard ground for precision

As every machinist knows, machine tools impart their precision through their chucks. That's why chuck dimensions and tolerances are of critical importance . . . and why Blanchard Surface Grinders are commonly used to produce the flat surfaces required.

Blanchard Surface Grinders are ideal for all kinds of precision grinding jobs. They produce extremely close tolerances for flatness, size and parallelism . . . *at low costs and high production rates.* Many Blanchard users grind surfaces flat to within 2 to 4 light bands, parallel to less than .0001", with dimension tolerance of .0002", and surface finish to better than 3 micro inches.

Whether your work involves precision machining or rapid removal of stock, take the advice of master machinists . . .

PUT IT ON THE BLANCHARD

No. 11 Blanchard Surface Grinder

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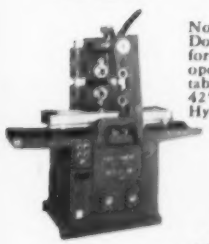
No. 3-36
HYDRAULIC MILLING MACHINE

Now—the family of Kent-Owens Milling Machines has expanded to give you the same unexcelled milling accuracy, speed and dependability for *larger size work!*

Proudly we present the No. 3-36 Hydraulic Milling Machine . . . the new "big brother" in the line of popular Kent-Owens Millers. Each Kent-Owens machine is ruggedly designed with advanced features throughout for greater dependability and accuracy to maintain tough production schedules. Write for bulletin 955 on wide range of hydraulic and hand-operated machines. Also, let Kent-Owens design and build your tooling and special machines.

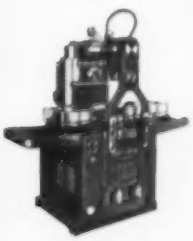
Kent-Owens Machine Co., Toledo, O.

Simple . . . Rugged . . . Efficient



No. 2-20DS . . . Double Spindle for two milling operations . . . 20" table travel . . . 42" x 12" table. Hydraulic feed.

No. 1-14 . . . 14" table travel . . . 32" x 9" table . . . hydraulic table feed . . . full automatic cycle.



No. 2-20 . . . 20" table travel . . . 42" x 12" table . . . full automatic hydraulic feed.

No. 1-M . . . Hand feed to table and head . . . 25" x 9" table . . . 12" table travel . . . head counter-balance is adjustable.

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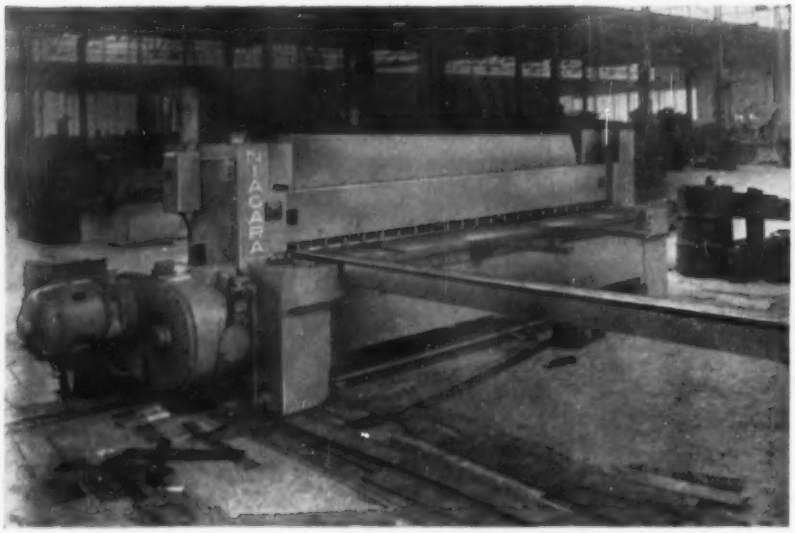


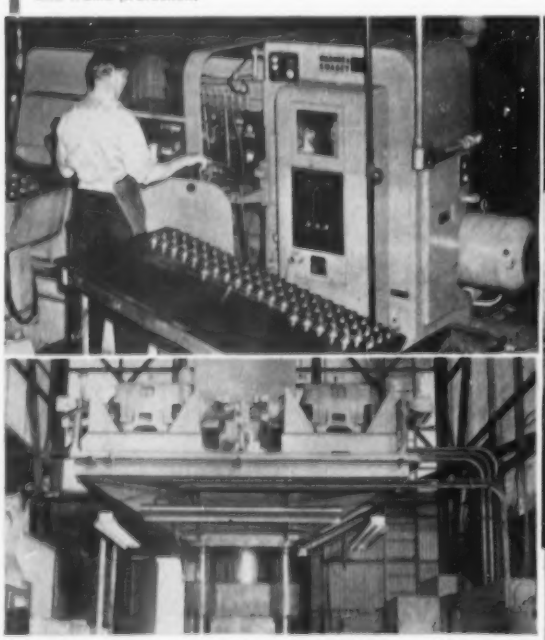
Century Performance-Rated Motor provides heavy duty muscle power for this large shear.

The ability to handle heavy shock load was an important factor in the selection of a Century Motor with proper torque and speed for this application.

Century Performance-Rated® Motors for

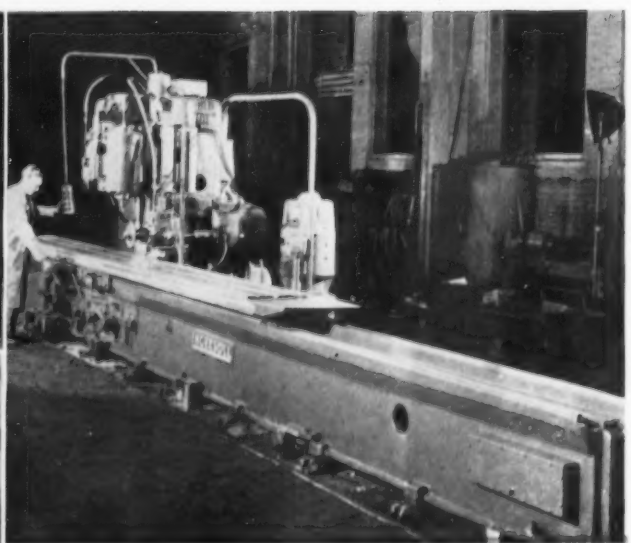
Century Performance-Rated Motor helps get production out fast on 5-spindle automatic chucking machine.

In the selection of a Century Motor, all the factors were Performance-Rated to match the specific application—speed, torques, mounting and frame protection.



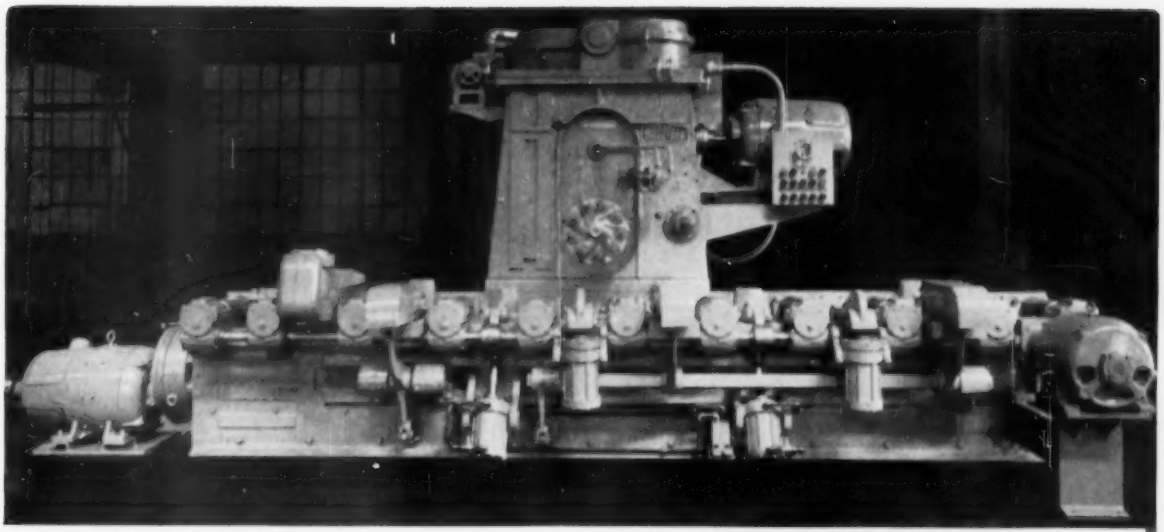
5 Century Performance-Rated Motors help produce 5,000,000 pounds of controlled pressure.

Each of the five 100 H.P. Century Motors possesses the proper torques and speed to help this giant press operate profitably.



5 Century Performance-Rated Motors help bring out the best performance from this 22-ft. keyway slotter.

With each motor engineered for top performance in its own specific job, the 5-motor Century team contributes to cost-saving operation of this important unit.



15 Century Performance-Rated Motors are the power team for fast skinning of high-chrome steel billets.

These *Performance-Rated* Century Motors provide ample power for skinning "52100" high-chrome steel billets at a rate of 2900 sq. in. per hour.

Modern Ideas

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Leading designers will tell you that much of the precision and efficiency of modern machine tools depends on motors properly "fitted" to the job. In many cases, these are Century Motors. Because they are Performance-Rated, Century Motors provide an unequalled wide range of speed, torque, mounting and frame characteristics. When properly selected, they bring out the best performance in any machine.

Get full value from your investment in new equipment . . . specify Century Motors! For Performance-Rated replacement motors, call your nearby Century authorized distributor or contact our District Sales Office.

Performance-Rated© MOTORS 1/8 to 400 H. P.

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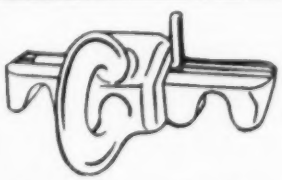
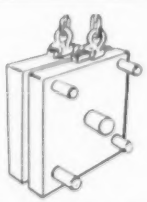
SAFETY FLANGE

protects fingers by providing roomy gripping space on either side of the die shoe. This flange may be mounted flush or on the edge of the die set and is welded in place. There is no extra charge for this valuable safety feature.



LOCK-JAW LIFTING DEVICE

removes the danger of handling large die sets. Heavy steel components of this device are welded in place forming an integral part of the die set. They are positioned to insure proper balance when the set is lifted by either chain fall or crane.



E-Z LIFT SLING CHAIN

is especially designed to fit the flanges of the die sets. Male jaws attached to the sling fit quickly into place for immediate lifting. There is no need for screw clamps, eye bolts, or lifting lugs.

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Contour polishing fluted areas of bits on 1/2" free-running belt.

Spinning-off faster, better finishes

With BEHR-MANNING Coated Abrasive Belts on the job, it's easy to bring-up superior finishes on difficult contours. For example, spin polishing hair-dryer domes (above) on smooth-cutting abrasive belts has proven a highly productive and efficient operation. Test these versatile, BEHR-MANNING Abrasive Belts on your parts — in your plant or in a nearby BEHR-MANNING Demonstration Room. Write for the Production Digest Bulletin. Contains 60 pages of detailed data on coated abrasive grinding and polishing techniques. Address Behr-Manning, Troy, N. Y., Dept. AM-6.

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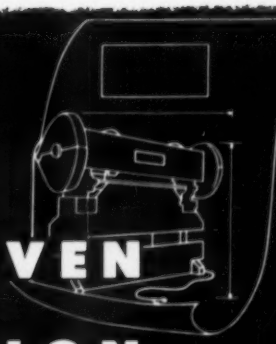

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From a background of more than 100 years of experience in building heavy metalworking equipment, Lodge & Shipley is producing power press brakes equal or superior to any other.

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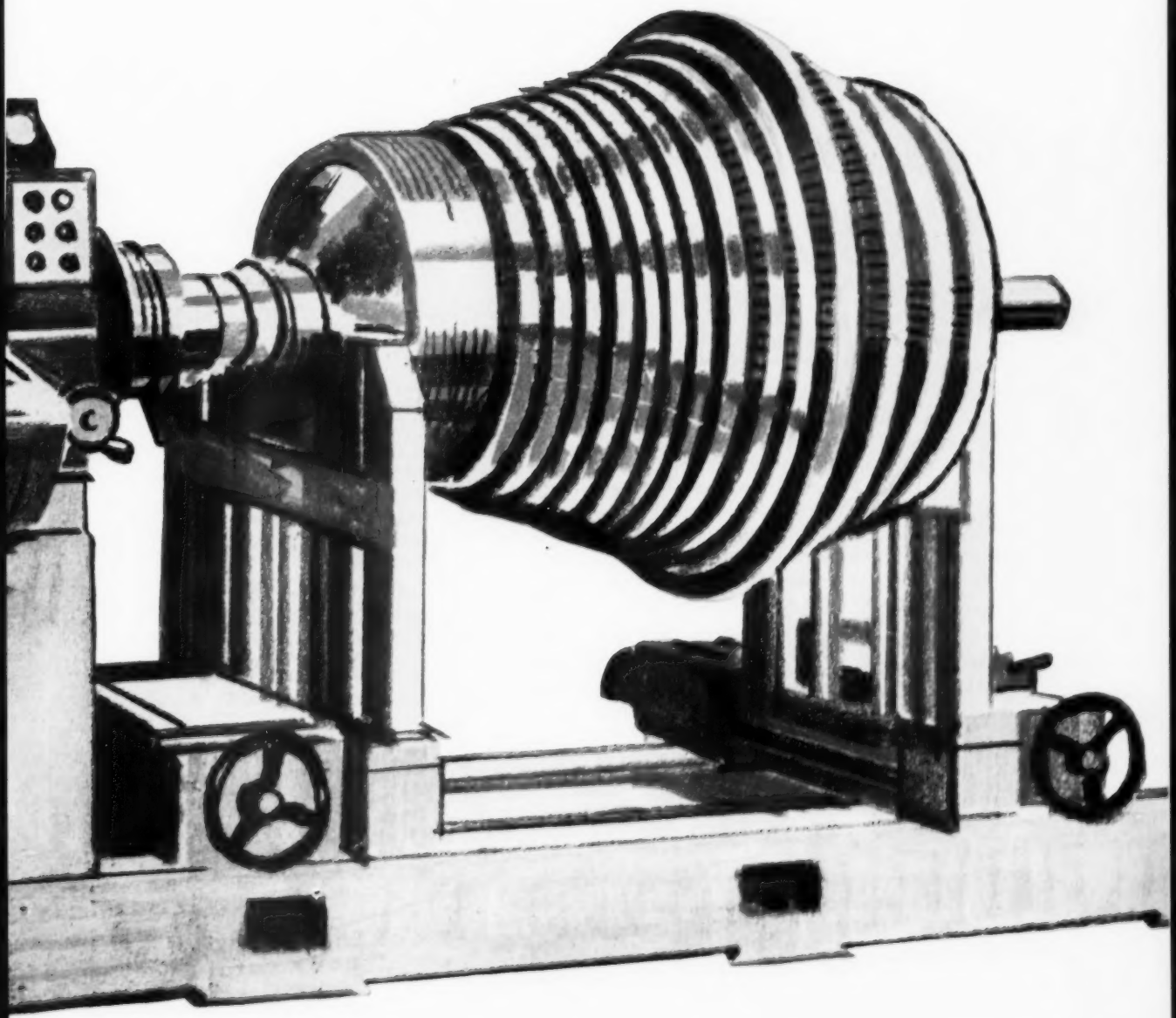
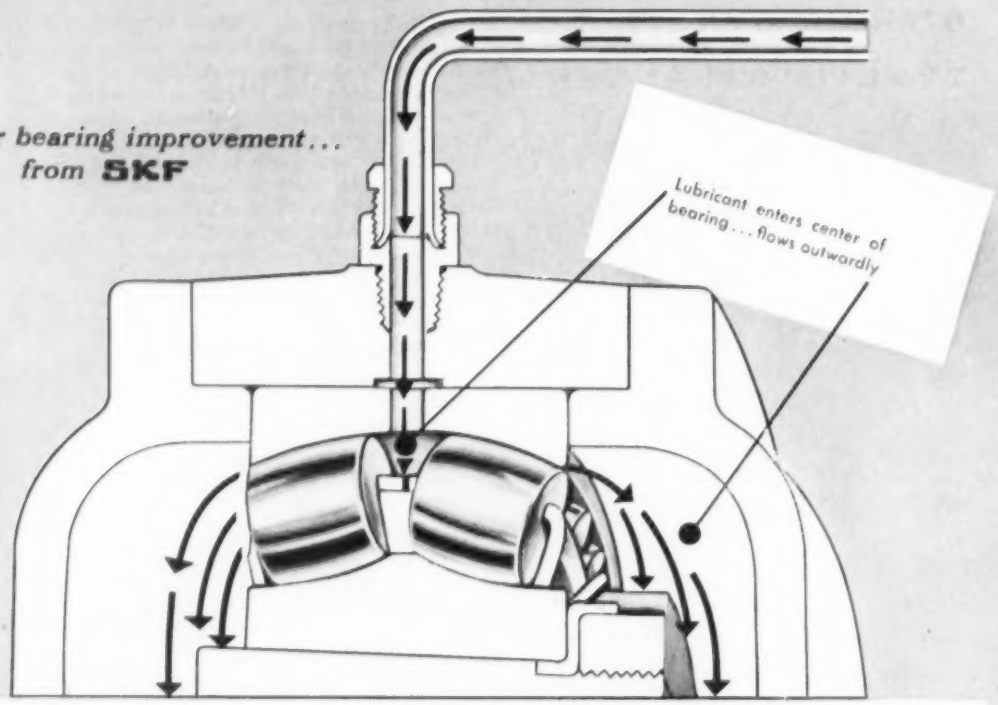
This latest design Gisholt DYNETRIC Type "U" Balancer has many outstanding features for quicker setup and faster, easier operation. Unbalance effects are accurately measured and located by unskilled operators. No computation is required—no charts or graphs. In short, here is a truly advanced design for better work at lower cost. If you're interested in the balancing of rotating parts or assemblies, large or small, we would like to tell you about these new machines—and show you how they may be applied profitably to your manufacturing processes.

Gisholt Machine Company, Madison 10, Wisconsin

Look ahead—keep ahead—with Gisholt



Another bearing improvement... from **SKF**



NOW AT NO EXTRA CHARGE-

SKF's improved method of lubricating large spherical roller bearings

To make the lubricant effective it should be located where needed—in the bearing. Also, new lubricant, when added, should enter where it does the most good—in the bearing.

For these reasons, all future production of SKF double row spherical roller bearings above 240 mm O.D. (9.4488") will be made with three equally spaced drilled holes in the center of the outer ring without any extra charge to our customers. *This permits the lubricant to enter the center of the bearing.*

With the lubricant (either grease or oil) being introduced into the center of the bearing, all working surfaces are quickly and completely covered. In addition, the outward flow flushes out the old lubricant, and with it, any abrasive dust, dirt, moisture or other impurities.

And where circulating oil lubrication is required, there is a continuous flushing and cooling of the bearing.

This is another example of how SKF helps you to obtain longer bearing life.

2711

Consult your SKF District Office today for complete information so that you can be the first to incorporate into your products this improved method of lubricating large spherical roller bearings.

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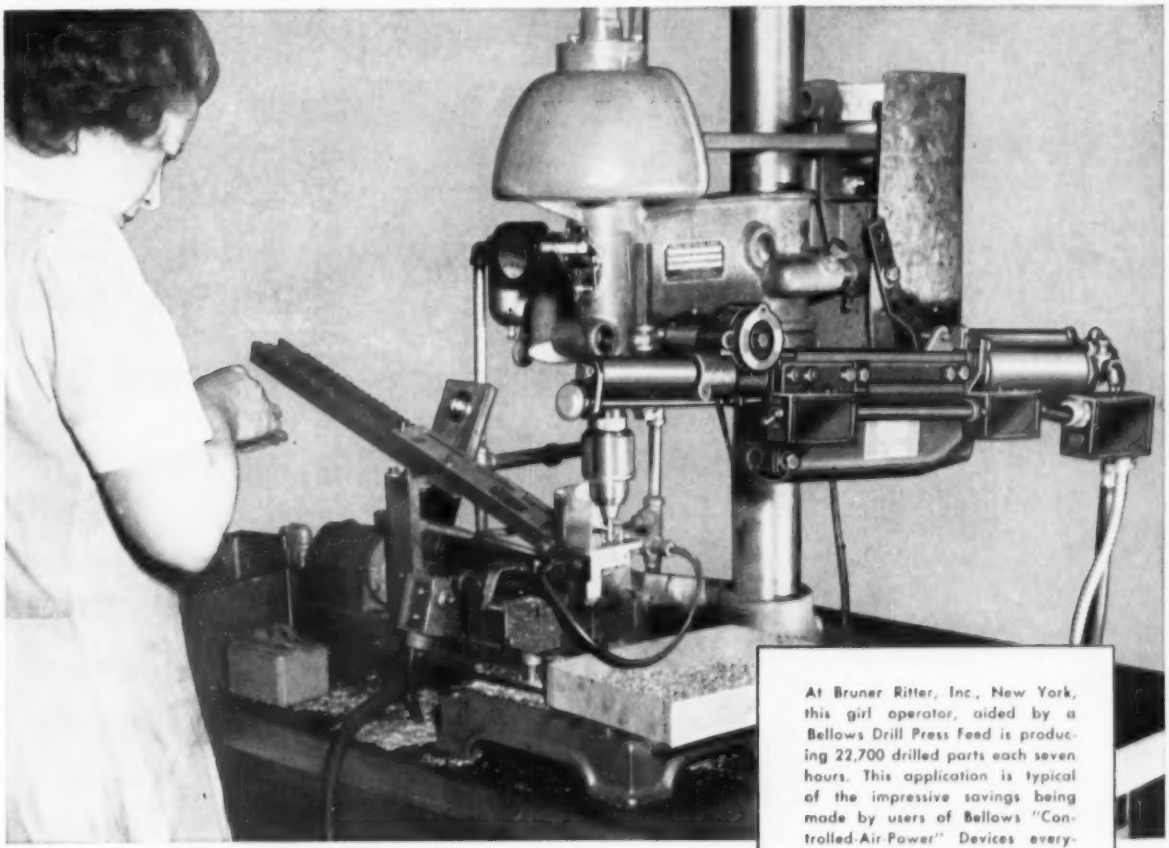


At Bruner Ritter, Inc., New York, this girl operator, aided by a Bellows Drill Press Feed is producing 22,700 drilled parts each seven hours. This application is typical of the impressive savings being made by users of Bellows "Controlled-Air-Power" Devices everywhere.

. . . has a place in every plant concerned with lower-cost production

The value of a minute is no more "fixed" than the value of a dollar. What it's worth depends on what you can do with it.

For example, a drill press operator positioning a part by hand, feeding the drill by hand, may produce X number of parts per hour. With Bellows "fluid power" on the job, she can produce between 2 X and 4 X parts per hour — and with a fraction of the physical effort.

Drill press operations are only typical. Wherever you have a repetitive operation of any kind done by hand, one or more Bellows "fluid power" units can do it faster, better, and with less fatigue to the operator.

These ingenious devices, powered by air, actuated electrically, controlled hydraulically, are complete "packaged" work units. They are designed to be incorporated into existing operations or standard machines easily and quickly. They lend themselves readily to custom machine design, making construction of special purpose machines relatively simple and inexpensive.

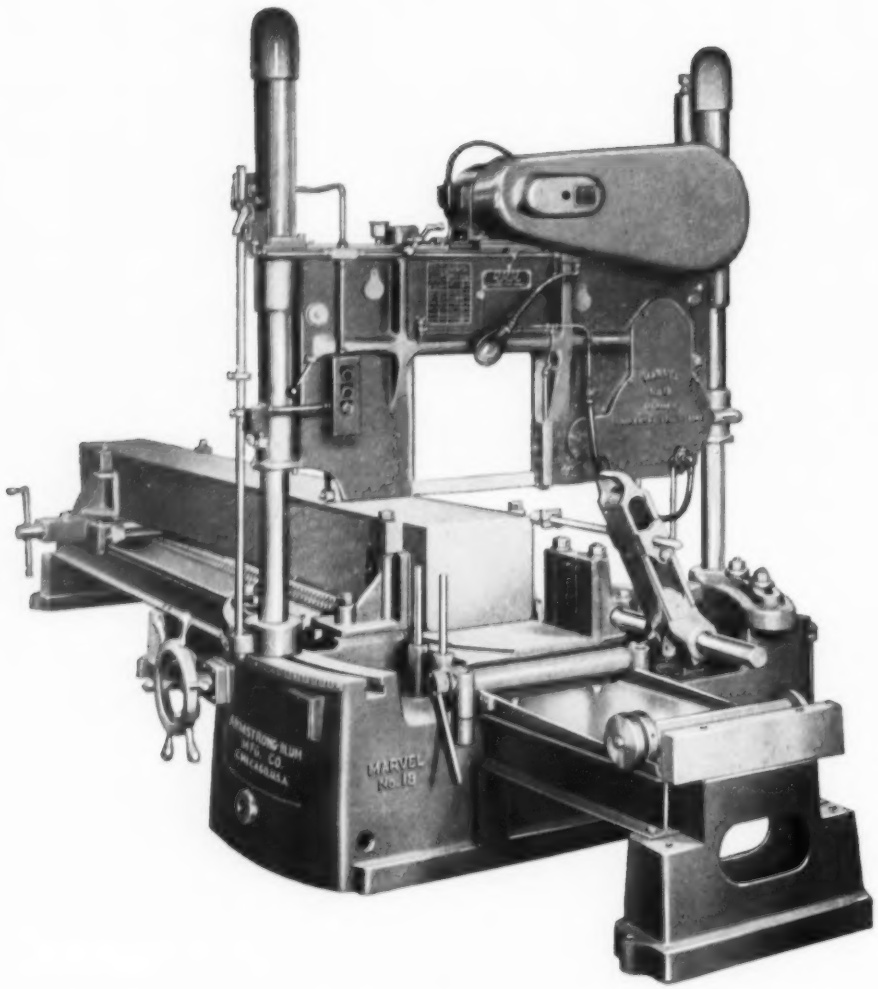
Get more out of *this minute!*

Write today for the new four-color booklet — "Lower Cost Production." And Bulletin DF-110R on Bellows Drill Press Feeds. They will be sent to you without cost or obligation. Address Dept. AM656, The Bellows Co., Akron 9, Ohio. In Canada: Bellows Pneumatic Devices of Canada, Ltd., Toronto, Ont.

The Bellows Co.

AKRON 9, OHIO

1426A



No Job too big or too tough . . .

for MARVEL "*Giant*" Hack Saws

These giant MARVEL Hydraulic Hack Saws (No. 18, Capacity 18" x 18"; and No. 24, Capacity 24" x 24") were *basically* designed for rapid and economical cut-off of BIG WORK. They are not merely "conventional" designs "stretched" to big capacity. They are truly designed and built with the ruggedness and rigidity necessary to withstand the rough treatment of sawing big work, even though the work is in the "toughest of the tough" alloys.

They are reliably fulfilling the cut-off requirements in innumerable steel mills, forge shops, structural shops, warehouses, and machine shops, with assured low tool cost and minimum kerf loss of steel.

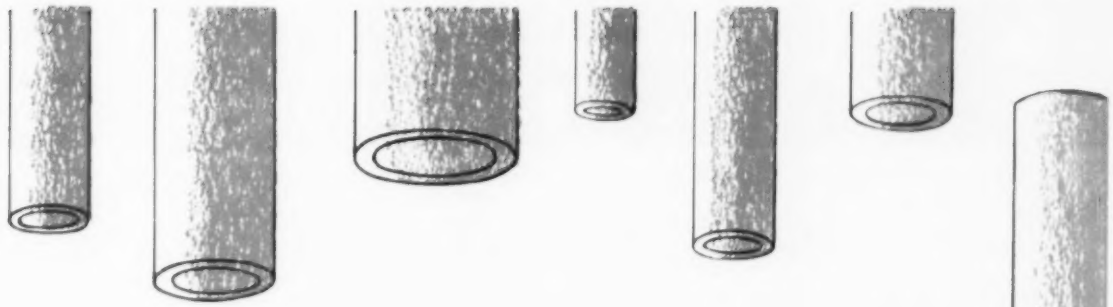
In addition to cutting-off, they are reducing costs by eliminating further machining operations. Heat treated die blocks are being reclaimed for re-sinking by sawing off the worn face; columns, beams, pipe, and tubing are being sawed to *finished*, square ends, eliminating milling; angular sawing is done conveniently by swinging the upper structure on the base, to any angle up to 45 degrees—*without moving the work*.

Contemplating the modern trend toward ever tougher steels and larger sizes, these are the logical sawing machines to buy, not only for today's needs but for tomorrow's as well.

Write for Catalog

MARVEL *Metal Cutting* SAWS
Better Machines-Better Blades

ARMSTRONG-BLUM MFG. CO. 5700 West Bloomingdale Avenue • Chicago 39, U.S.A.



See how much YOU will save when you buy ASARCON BEARING BRONZE in the exact length you need

If you're buying standard 13-inch bronze bars, you have a remnant problem; and that's expensive!

Prove it to yourself. Take your pencil and fill in the blanks below:

TOTAL LENGTH OF PARTS FROM 13" BAR STOCK _____

LENGTH OF SHORT END SCRAP _____

WEIGHT PER INCH OF BAR STOCK YOU USE _____

WEIGHT OF SCRAP PER 13" BAR _____

COST PER POUND OF BRONZE YOU USE _____

COST OF SCRAP PER BAR _____

Now multiply the cost of your scrap by the numbers of bars you use per month and you can see how much short-end scrap is costing you.

If you want to save this money, buy Asarcon Bronze rods, tubes and shapes in exactly the length you need up to 105"; and in any diameter up to 9". Talk to your nearby Asarcon distributor, or write to us directly. We'll be happy to show you how other companies are turning bronze scrap-end losses into profits.

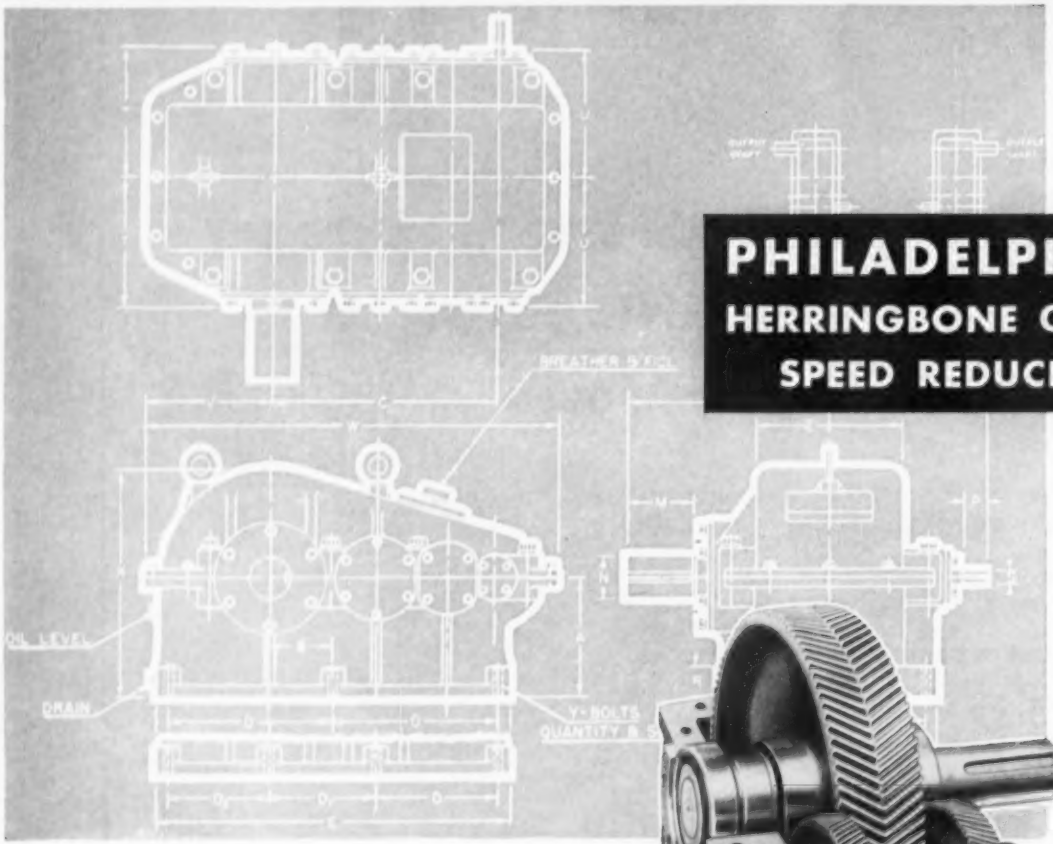
Continuous-Cast Products Department

AMERICAN SMELTING AND REFINING COMPANY

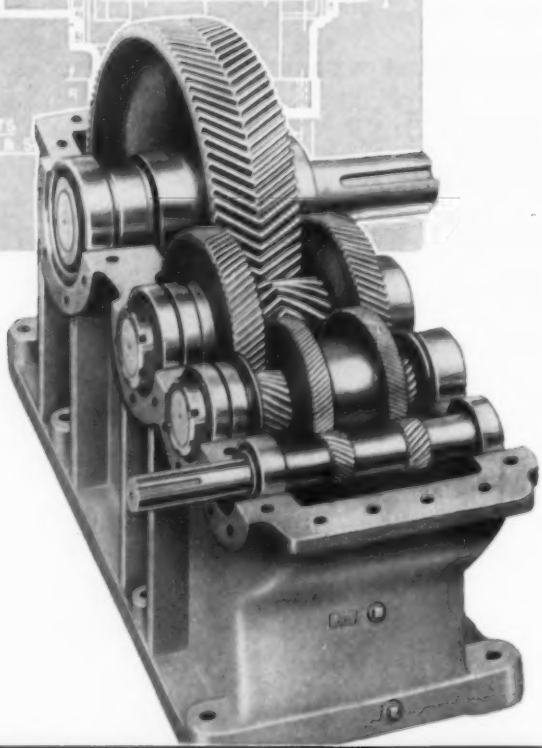
Perth Amboy Plant, Barber, New Jersey • Whiting, Indiana
WEST COAST SALES AGENT: Kingwell Bros. Ltd., 457 Minna Street, San Francisco
IN CANADA: Federated Metals Canada, Ltd., Toronto and Montreal

ASARCO

Here's the Reducer with a BACKBONE .... and a BACKGROUND



PHILADELPHIA HERRINGBONE GEAR SPEED REDUCER



Yes, Philadelphia Herringbone Reducers can truthfully be said to be *Reducers with a "backbone" and a "background,"* because we have not only been making industrial speed reducers since their inception—but we were one of the pioneers in applying the Sykes continuous tooth type gear to speed reducers.

If you have a problem involving high horsepower speed reduction with heavy shock loads, Philadelphia Herringbone Reducers are the answer. These quality-built units are available in Single, Double and Triple Reduction Types, offering a wide selection of capacities and reduction ratios. The continuous tooth type herringbone gears assure evenly distributed pressure over each tooth from the top to the working depth line—which means exceptionally long life, minimum vibration, quiet operation and maximum transmission of power . . . Thousands of Philadelphia Herringbone Reducers are in daily use, in most every line of industry. Be convinced, send for Catalog H-55.

PHILADELPHIA GEAR WORKS, INC.

ERIE AVE. & G ST., PHILADELPHIA 34, PA.
NEW YORK • PITTSBURGH • CHICAGO • HOUSTON • LYNCHBURG, VA.
BALTIMORE • CLEVELAND
Virginia Gear & Machine Corp. • Lynchburg, Va.

Industrial Gears & Speed Reducers

LimiTorque Valve Controls

Established 1892

TOP ROUND GROUND

PHOTOGRAPHED AT DETROIT PRODUCTIVE PARTS, CLAWSON, MICH.

You get right to the meat of your centerless grinding problem when you specify wheels by CARBORUNDUM. Each is designed and built with the *one* combination of abrasive grain and bond to perform your specific job best. Regulating wheels, too, are job-engineered at CARBORUNDUM.

For instance, a special resilient-center regulating wheel, developed for armature grinding and similar work, eliminates the grinding pressures and faulty finish created by conventional feed wheels. *You* can benefit from this outstanding leadership in centerless grinding.

Call in your CARBORUNDUM Distributor or salesman today—to survey your operations and recommend the wheels you need. Or write The Carborundum Company, Niagara Falls, New York. In Canada: Canadian Carborundum Company, Ltd., Niagara Falls, Ontario.

Through application "know-how" and product quality

CARBORUNDUM

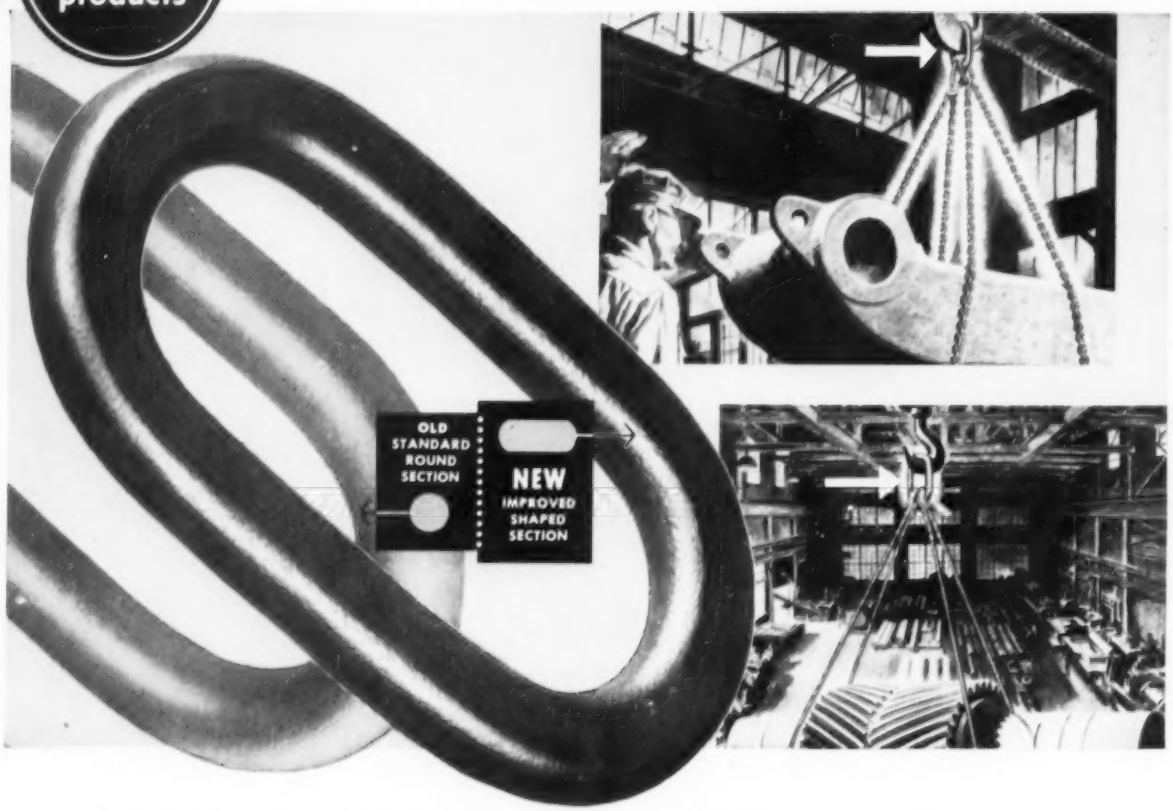
REGISTERED TRADE MARK

continually puts more sense in your abrasive dollar

ACCO products

ACCO Registered* Slings–Wire Rope & Chain

THE STANDARD OF EFFICIENCY AND SAFETY



New Master Link for Slings—Either Chain or Wire Rope—Holds Its Form Under Loads Up to 18% Greater

• Latest product of the continuing research behind ACCO *Registered* Slings is this new Shaped Section Master Link. ACCO's engineers found that by shaping the link—as shown above—they could give it more "dimensional stability"—a better "section modulus." Translated into layman's English this means that the new shaped link, without any increase in weight, will withstand deformation under loads up to 18% greater than a standard round section link will.

Just as shaping a quantity of metal into a structural I-Beam allows it to handle greater loads than it could as a solid beam, so does ACCO's Shaped Section Master Link give better performance under greater loads than a link with a round section.

The new shaped link is smoother and provides a greater factor of safety. It is a better and safer link. It costs us more to make. But it will be offered on all ACCO *Registered* Slings—both wire rope and chain—at no increase in price.

AN EXTRA BONUS OF SAFETY

This latest technological advance adds an extra bonus of safety to ACCO *Registered* Slings.

Each component of an ACCO *Registered* Sling is made from the best materials procurable for its use. Each part must prove to have strength equal to or greater than the sling body. All hooks for ACCO *Registered* Slings are Magnaflux tested. Then these components are assembled into slings according to carefully engineered designs that have proved themselves in rigorous field tests.

The completed sling is then individually proof-tested to twice the working load limit. Then and only then, is it awarded the coveted ACCO Registration Certificate and the identifying ring or tag.

SEE YOUR DISTRIBUTOR

ACCO *Registered* Slings are readily available from a distributor near you. If you don't know him write to our Bridgeport office for his name.

*Trade Mark Registered

ACCO

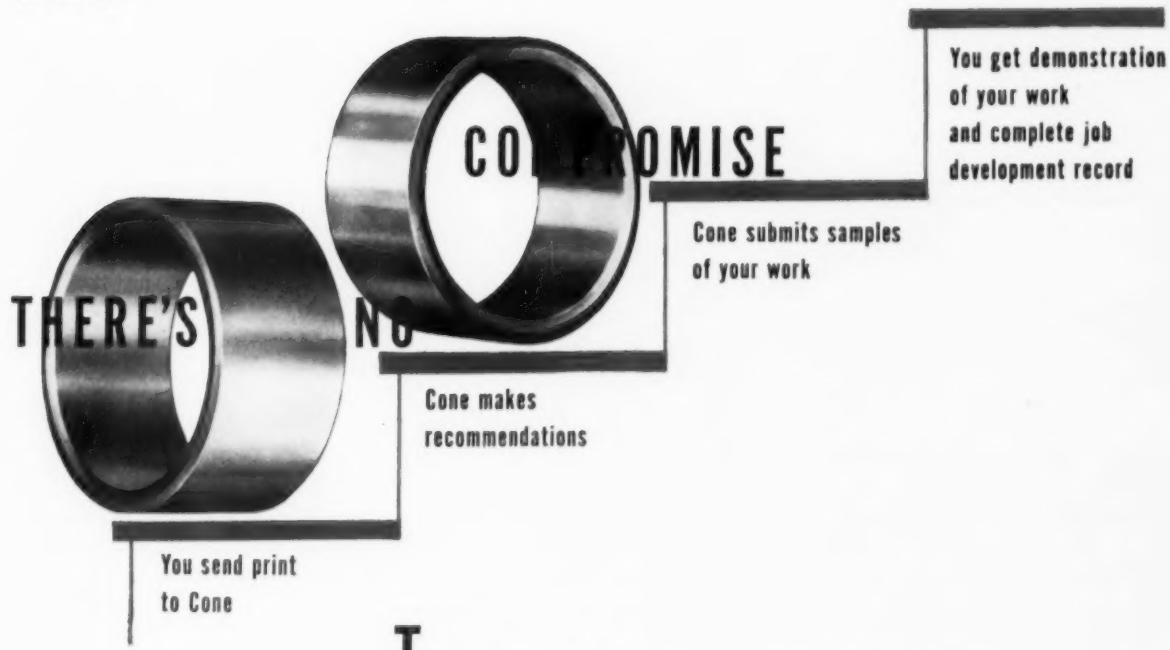
AMERICAN CHAIN & CABLE

BRIDGEPORT, CONN.

Atlanta, Boston, Chicago, Denver, Detroit, Houston, Los Angeles, New York, Odessa, Tex., Philadelphia, Pittsburgh, Portland, Ore., San Francisco, Wilkes-Barre, Pa., York, Pa.
In Canada: Dominion Chain Co., Ltd., Niagara Falls, Ont.

Better Value

No. 6 in a series


THERE'S NO COMPROMISE
You get demonstration of your work and complete job development record
Cone submits samples of your work
Cone makes recommendations
You send print to Cone

There is no adequate compromise with efficient production practices, if you are in business for a profit.

But you don't always know just how competitively efficient your equipment is. Case histories of what the other fellow is doing are sometimes garbled. At least the poor ones are not advertised. And conditions vary in all plants. Sometimes you have reason to be more concerned with what you don't want in new equipment than with what you do want. Cone believes too much is at stake for a machine to go into a line unequipped for the job, with either carbide or hss tools.

The Conomatic Carbide Development treats each job individually from standpoint of work, machine, tools, and operating personnel.

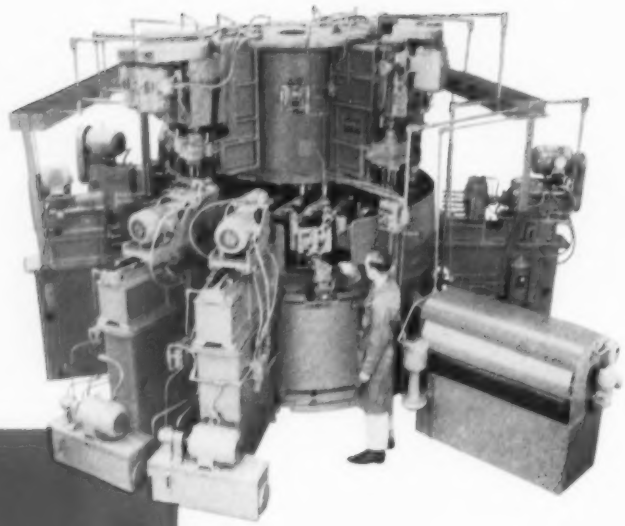
DATA FOR COMPARISON

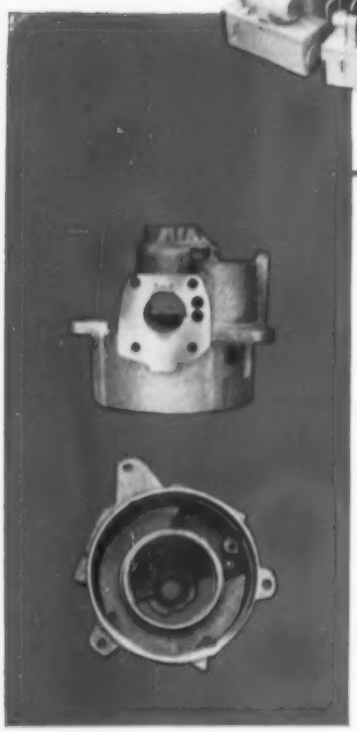
Part	Bushing	Length	⅝"
Machine	1⅝" Conomatic	Hole Dia.	1¼"
Tools	100% Carbide Tipped	RPM	825
Material	8620	Time	14.8 Secs.
Stock Size	1⅝"		

Conomatic

For particulars send for "Four Steps With Cone"

CONE AUTOMATIC MACHINE COMPANY, INC., WINDSOR, VT., U. S. A.





18
STATIONS

47
OPERATIONS

120
PARTS/HOUR

THIS intricate production giant is also a triumph in metal-working flexibility. Designed for a leading appliance manufacturer, the MORRIS Model 334-S High Production Machine processes one-cylinder *or* two-cylinder housings at the rate of one every 30 seconds.

Yet there's no model change-over problem! The MORRIS completely automatic "special" machine uses a MORRIS basic center column machine equipped with an 84″ dia. table, an 18-station automatic hydraulic index, and MORRIS Unit-Type Machine Tools.

A total of 47 spindles, mounted on three 8-inch way type units, six No. 2 CAM-MATIC Drill Units and eight AIR-OIL-MATIC Drill Units, are used to mill, drill, counterbore, spot face, bore, ream and tap housings.

The result . . . a "special" machine at a fraction of the usual special machine cost . . . accurate, flexible, fast!

Investigate the production-boosting and cost-saving advantages of MORRIS Unit-Type High Production Machine Tools.

WRITE TODAY for detailed literature, or outline your production problem for analysis by MORRIS engineers.

1 ..... LOAD 1 PART

2H ..... MILL 1 SURFACE

3H ..... FINISH MILL 1 SURFACE

4V ..... DRILL AND BURR 1 HOLE
DRILL AND COUNTERBORE 4 HOLES

5H ..... DRILL 4 HOLES
V ..... DRILL AND BURR 1 HOLE
DRILL 2 HOLES

6V ..... BURR 2 HOLES
REAM 1 HOLE

7H ..... SPOT FACE 3 PLACES
V ..... DRILL AND BURR 1 HOLE
DRILL 1 HOLE
MILL .250 RADIUS

8V ..... REAM 1 HOLE BURR 1 HOLE
BURR .250 MILLED RADIUS

9A ..... MILL 1 SURFACE
H ..... DRILL AND BURR 4 HOLES
REAM 1 HOLE

10 ..... The angular operation at Station 9
11 ..... utilizes those two stations as well.

12V ..... TAP 1 HOLE
A ..... DRILL FOR REAMING

13V ..... ROUGH BORE CYLINDER DIAMETER

14V ..... SEMI-FINISH BORE AND CHAMFER CYLINDER DIAMETER

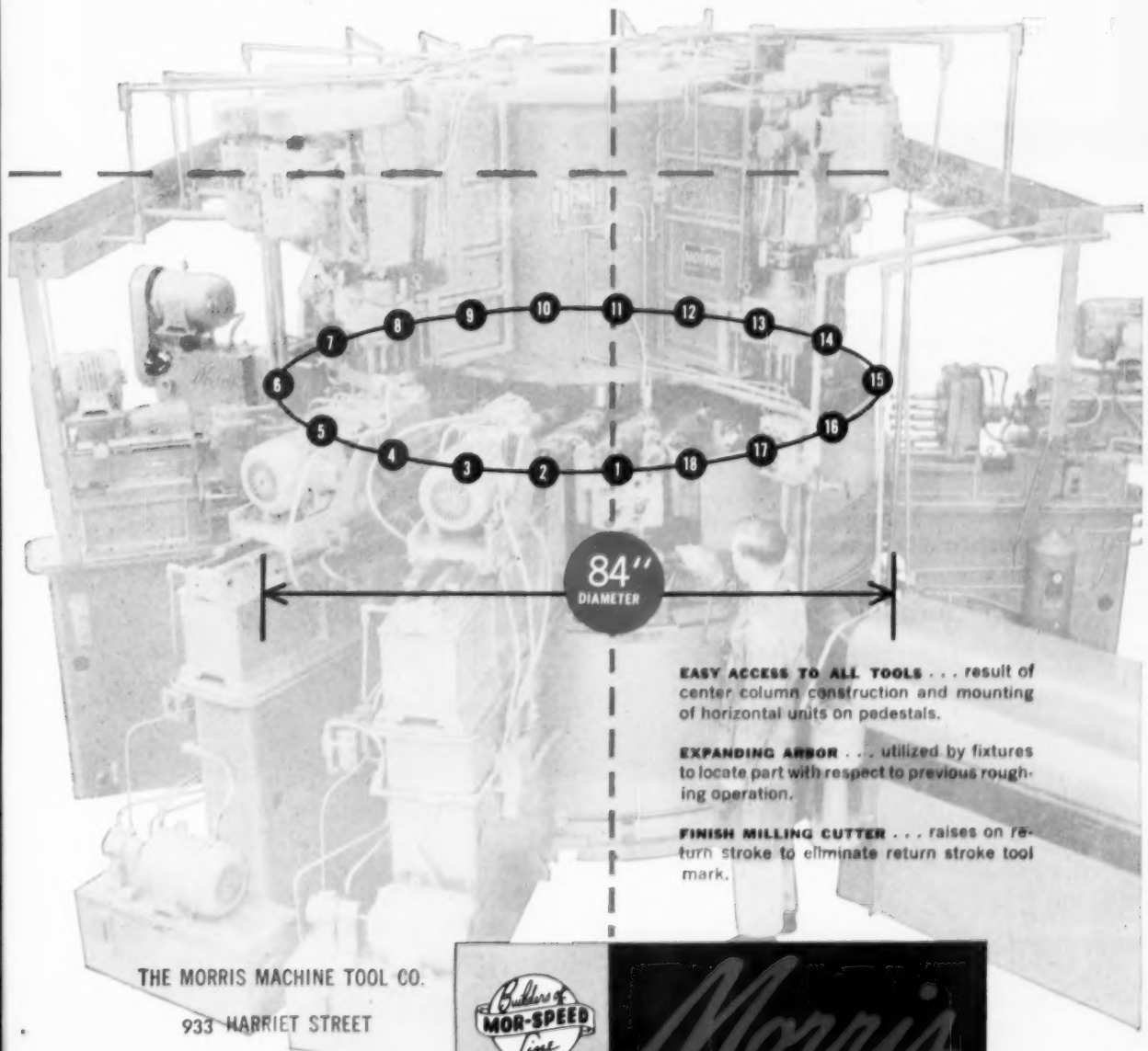
15H ..... TAP 4 HOLES
V ..... FINISH BORE CYLINDER DIAMETER

16V ..... CHAMFER BOTTOM OF BORE WITH RECESSING TOOL

17V ..... TAP 5 HOLES

18 ..... Station 18 is reserved for additional operations for future part changes.

Operations: H—Horizontal
V—Vertical
A—Angular



EASY ACCESS TO ALL TOOLS . . . result of center column construction and mounting of horizontal units on pedestals.

EXPANDING ARBOR . . . utilized by fixtures to locate part with respect to previous roughing operation.

FINISH MILLING CUTTER . . . raises on return stroke to eliminate return stroke tool mark.

THE MORRIS MACHINE TOOL CO.
933 HARRIET STREET
CINCINNATI 3, OHIO

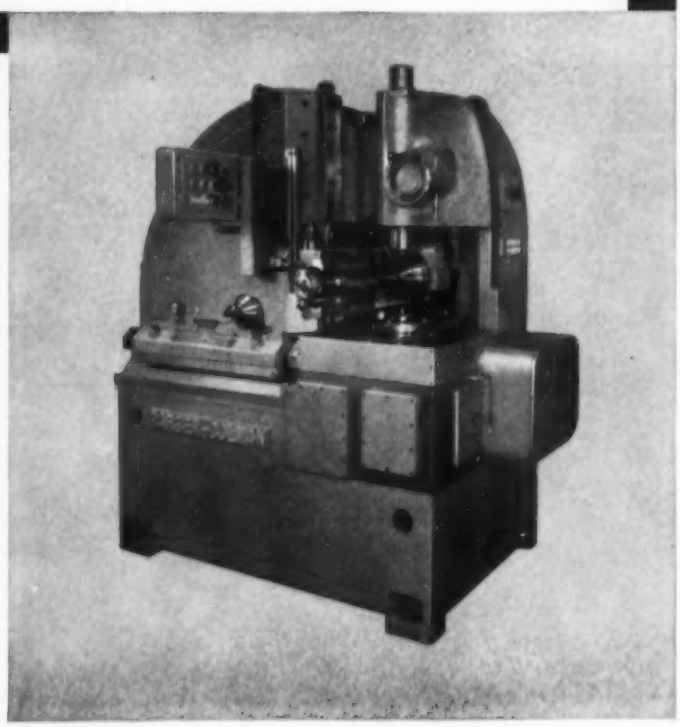
Builders of MOR-SPEED Line

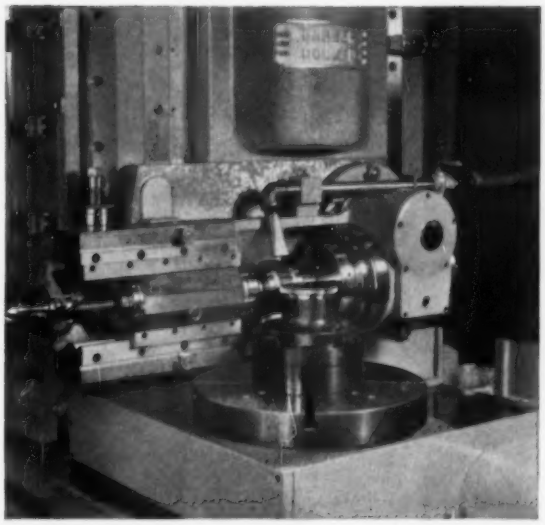
Morris

a new concept of gear accuracy!

Barber • Colman Builds World's Most Accurate Hobbing Machine

First hobbing machine ever guaranteed to cut gears within 10 seconds angular error





Barber-Colman has designed and built, in collaboration with Sperry Gyroscope engineers, a new type of hobbing machine which hobs without any further finishing operation, gears for the most accurate radar, navigational and computing equipment. This machine is known as the "Ultracision" Hobbing Machine and is so accurate that gears cut by it will transmit motion within 10 seconds of true angular rotation. This is equivalent to .0001" on 4" diameter, which is the only size that has been thoroughly investigated at the present time. This means that the combination of lead, profile and spacing errors measured over non-adjacent teeth cannot exceed 10 seconds of true angular displacement at any diameter along the involute.

In order to arrive at this degree of precision, it has been necessary to provide new methods of positively checking such accuracy. Sperry engineers utilize theodolites and auto-collimators in conjunction with pneumatic, electronic and mechanical gaging equipment which assures accurate measurement within millionths of an inch.

the machine

To produce gears of this accuracy, many new and unusual features have been incorporated in the hobbing machine. The greatest care in manufacture and assembly has been used for all parts. All vital surfaces on the machine are scraped within .0001" per foot, and even the covers are scraped to fit the scraped portions of the bed casting to prevent entry of foreign matter.

Since the machine is designed to cut only spur gears, the feed drive is independent of the main drive. Capacity of the machine is 10" diameter blanks, 6" maximum length of hob carriage travel, and maximum rated pitch capacity of 32 DP. Drives to the work and hob spindles have been made as short as possible to minimize any twisting and vibration. An extremely accurate index worm and gear are mounted in ultra-precision taper roller bearings. Except for the index change gears, the gear train between the main drive shaft and the index worm contains only a worm and worm gear, and a pair of 90° helical gears.

The basic machine weighs 11,000 lbs., (with controls 13,800 lbs.) to provide the rigidity necessary for this exceptional accuracy. Another feature for increased rigidity and accuracy is the elimination of a hob slide. The hob is mounted directly on an expanding arbor, and shifted on this arbor, rather than by means of a hob slide.

Adjustments are provided for trueing the hob spindle within a few millionths of an inch. Both hob spindle and outboard support are mounted in ultra-precision taper roller bearings.

the hobs

To attain extreme profile accuracy on the gear teeth, Barber-Colman also has developed a new class of hob called "Ultracision", and made to limits of .00008" lead variation in one axial pitch, and .00015" in 3 axial pitches. These limits are just half of those for Class AA hobs. These hobs are ground and have larger than standard diameters to permit a greater number of hob teeth for very fine finish on the gear tooth profiles. Wide hubs and a 2" diameter straight bore provide maximum rigidity for the hob.

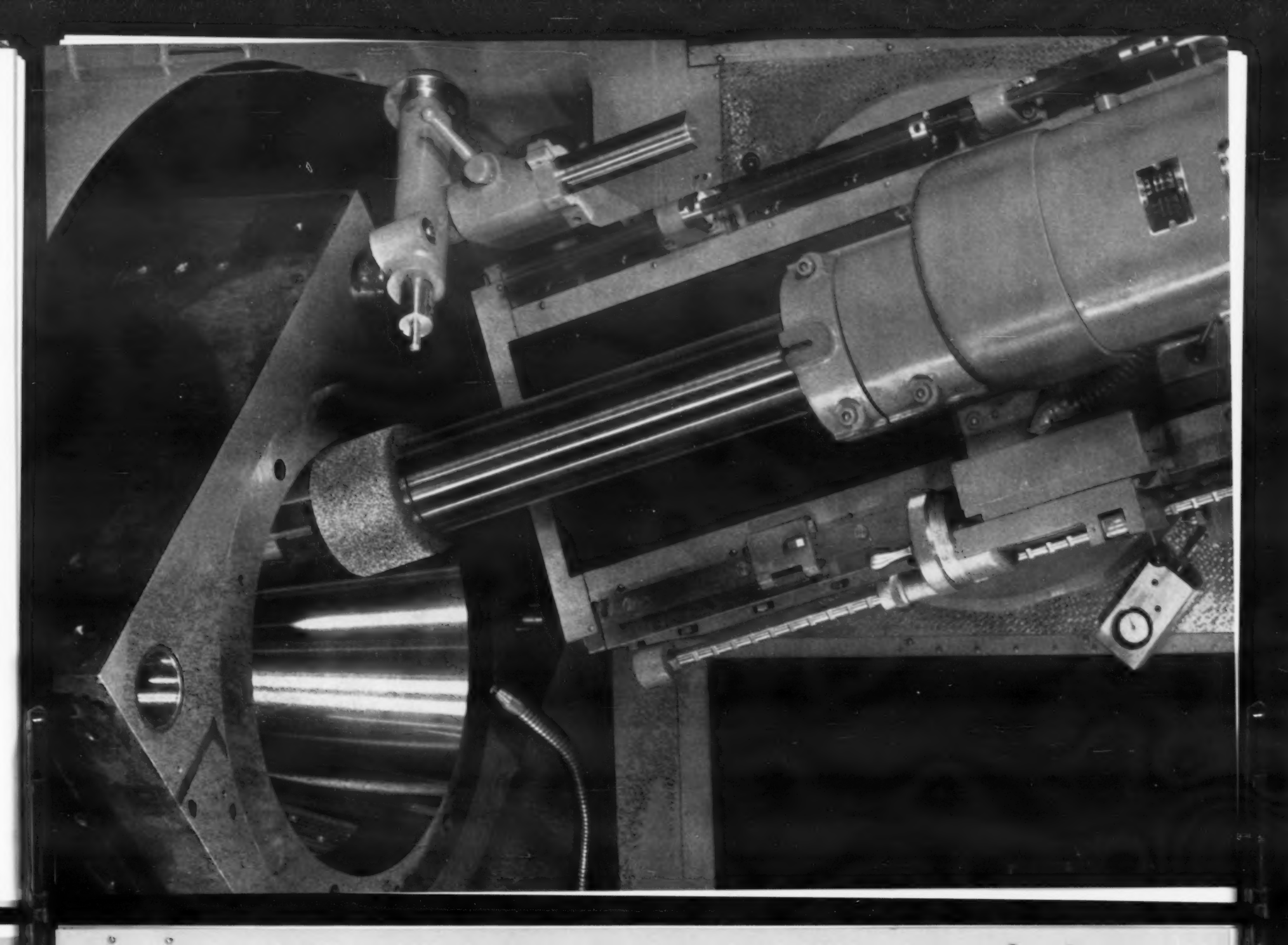
The development of this new concept in gear accuracy — the finest limits of gear accuracy ever obtained on a production basis — will eventually reflect in a higher standard of quality for gears produced on standard production hobbing machines. You are invited to submit your gear specifications and problems for analysis and recommendations by our engineers. Detailed information on the new "Ultracision" Hobbing Machine is available on request.

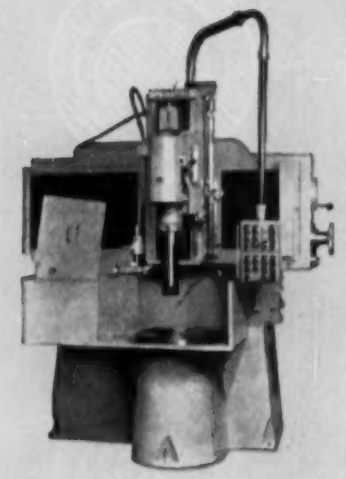
BARBER-COLMAN COMPANY

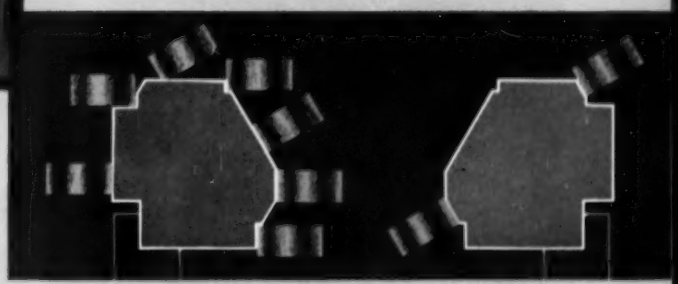
616 ROCK STREET • ROCKFORD, ILLINOIS

Hobs • Cutters • Reamers • Hobbing Machines • Hob Sharpening Machines

BARBER COLMAN







one setup: nine jobs

As flexible, as responsive as a dentist's drill, a Springfield Vertical Universal Grinder can reach around and into a workpiece to do nine different jobs on one chucking.

If you make a pipeline valve, a mold, a bearing race—requiring micro-inch finish on any or all the faces shown in the diagram—at whatever angle—look into Springfield. These grinders cut down the number of set-ups, frequently eliminate hand-lapping, operate with fewer work-holding devices. And, as a bonus, on jobs calling for extreme concentricity, one angle setting of the Springfield head grinds both faces of mating parts.

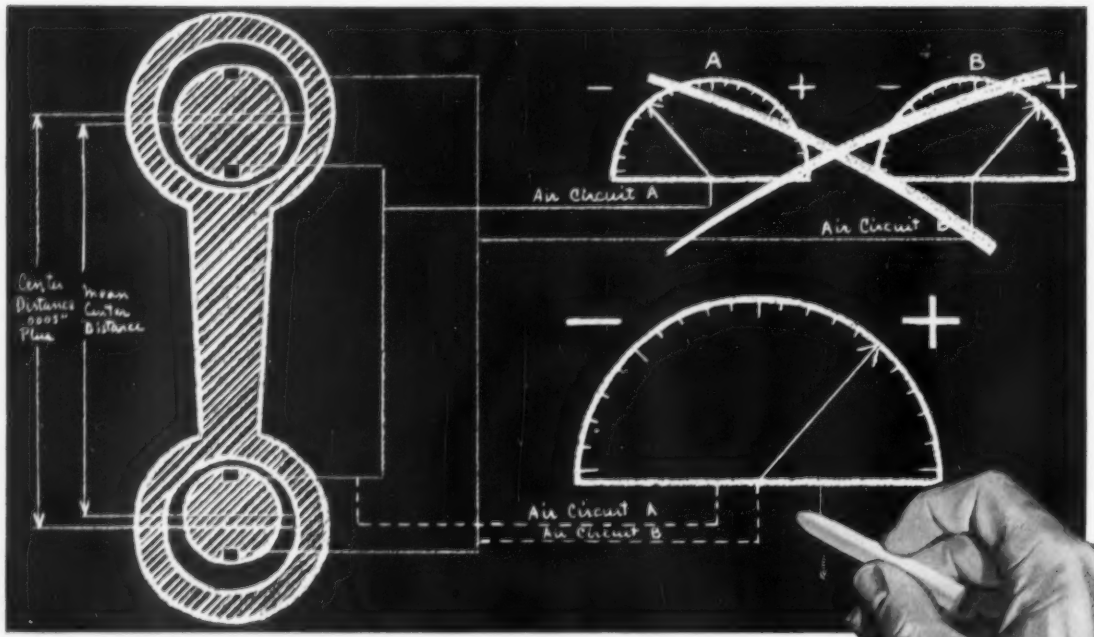
All three models readily adaptable to special problems.

Vertical Universal Grinders: swings 18″, 24″ and 42″.

Lathes: Engine and tool room, contouring and reproducing—swings 14″ to 32″.

The Springfield Machine Tool Company
Springfield, Ohio
SIXTH YEAR OF BUILDING IDEAS INTO MACHINE TOOLS

SPRINGFIELD



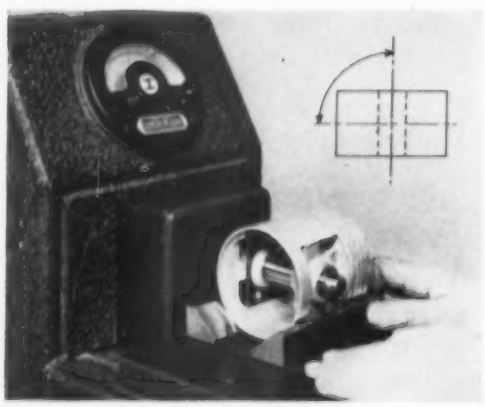
NOW! Gage Center Distance with Just One Dial

...using a Taft-Peirce Comp-U-Tair*

Gage parts twice as fast — and far more easily — with this exclusive T-P *computing* air gage . . . the Comp-U-tair.

Checking a dimensional relationship like center distance, for example, is greatly simplified. The Comp-U-tair measures, computes, and indicates the result on a *single* indicator with *one* pointer. The Comp-U-tair is a *differential air gage*, in which two air circuits are applied to opposing sides of the differential device. Gaging nozzles are placed so that diameter variations cancel each other and have no effect on true center distance reading. Operator reads just one dial, does no calculating, and has an instant, positive indication for every part — in or out of tolerance, plus exact amount and direction of variation.

Streamline your gaging with the unique Comp-U-tair. Call Taft-Peirce to save time and money throughout your inspection operations. As a starter, write for Air Gage Catalog No. 613.



The Comp-U-tair does many other jobs . . .

One big time-saver is measuring squareness, shown above. Squareness is indicated on *one dial with one pointer.* The Taft-Peirce Comp-U-tair figures as it measures, can be designed to check several dimensional relationships *simultaneously.* Number of dials is cut in half . . . inspection is faster, more accurate.

*Patent Pending

THE TAFT-PEIRCE FAMILY...

- Magnetic Chucks
- Precision Gages
- Air Gages
- Grinding Machines
- Lapping Machines
- Tool-Room Specialties

TAKE IT TO TAFT-PEIRCE

TAFT-PEIRCE MANUFACTURING COMPANY
WOONSOCKET, RHODE ISLAND

T-P Means TOP Precision

Acme · RYDER

MULTIPLE-SPINDLE *Vertical Chucker*

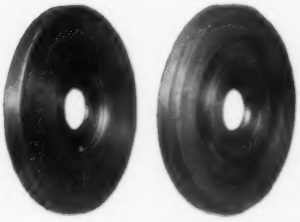
JOB FACTS

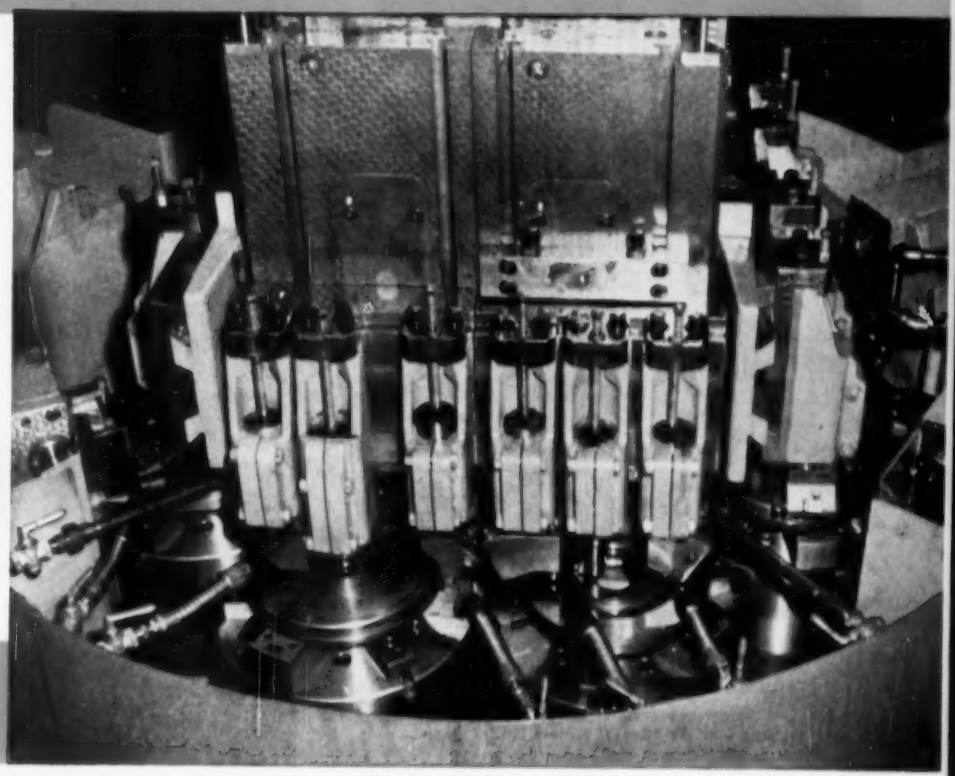
Piece: Cast Iron Flywheel (casting 1-1/2" x 11-3/16" dia.)

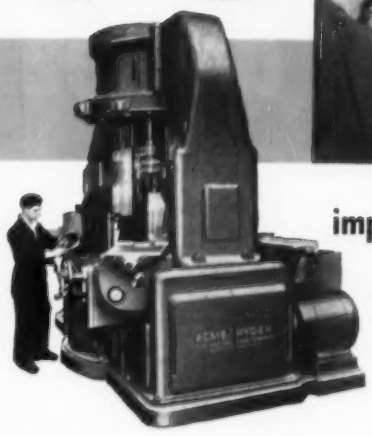
Operations: 26—Machine arranged for double indexing complete both sides of the piece, in one machine setup (10 to rough and finish Machine first side, 16 for second), using carbide tooling throughout.

Machine Time: 43 seconds.

Machine: Acme-Ryder 14" Eight-Spindle Vertical Chucker.







Do your present machining methods meet Acme-Ryder standards? Our sales engineer can help you make comparisons—or provide a demonstration at your convenience.

improves machining efficiency on large forgings and castings

Arranged for double indexing, the Acme-Ryder 14" Vertical Chucker completes both sides of this 11-inch cast iron flywheel simultaneously in 43 seconds total machine time.

Four independently operated cross slides, an exclusive Acme-Ryder feature heretofore unavailable on this type of machine, provide greater tooling flexibility—let you perform more secondary operations in the primary machining setup.

In addition, this new vertical chucker has ample power to take the heaviest cuts with carbide tooling while maintaining fourth-place decimal point accuracy. AND, it provides a generous reserve to accommodate future tooling developments.

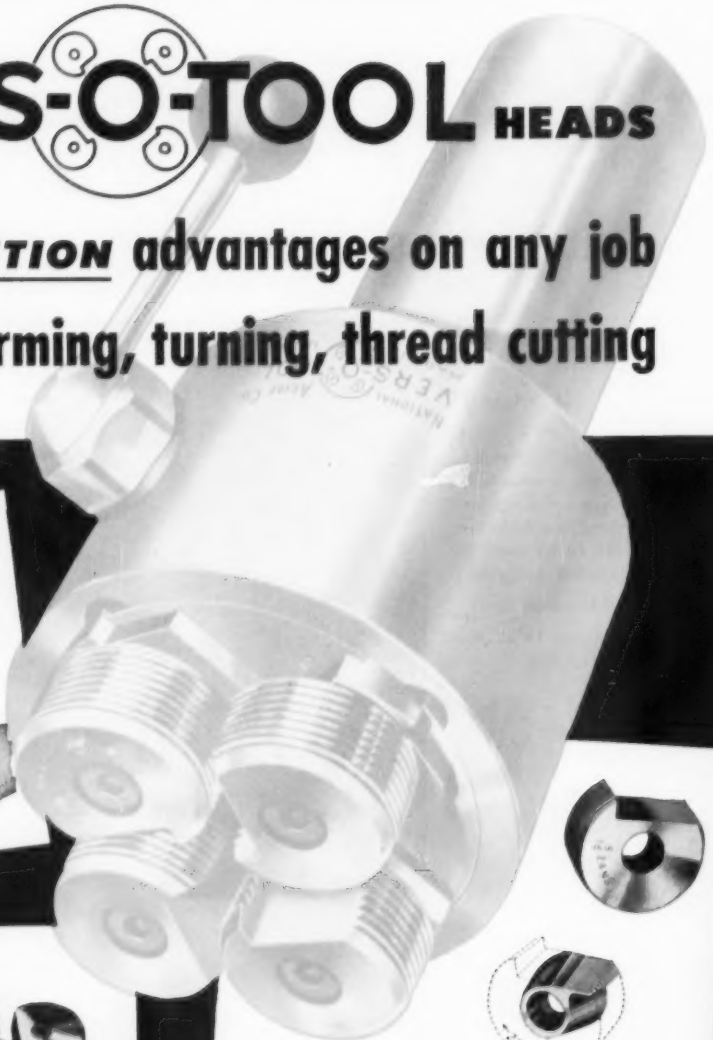
National Acme

THE NATIONAL ACME COMPANY, 171 EAST 131ST STREET, CLEVELAND 8, OHIO

The Namco VERS-O-TOOL is the world's most versatile threading and hollow milling head . . . read about it on the next page →

WITH VERS-O-TOOL HEADS

you get *PRODUCTION* advantages on any job requiring end-forming, turning, thread cutting

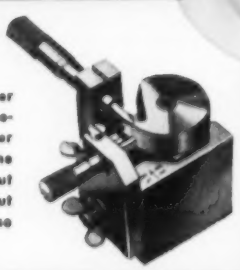


QUICK, SIMPLE CHANGE-OVER

Vers-o-tools provide for quick removal of threading chasers (or milling cutters) on their holding blocks—without disturbing head adjustment or set-up.

NO "CUT-AND-TRY" REQUIRED

Take the guess-work out of chaser grinding with the "Namco Vers-o-tool System": sharpen each chaser on its holding block, then check the grind on Namco micrometer gage; put the set back in the head without need for further adjustment—no "cut-and-try" required.



MANY REGRINDS PER SET

You can grind and regrind 270 usable degrees of Namco chaser circumference—one set cuts more threads than 10 sets of conventional chasers.

use the same Vers-O-Tool Head . . . change only cutters and blocks

THREADING

END-FORMING

END-TURNING

TURNING-THREADING

KNURLING

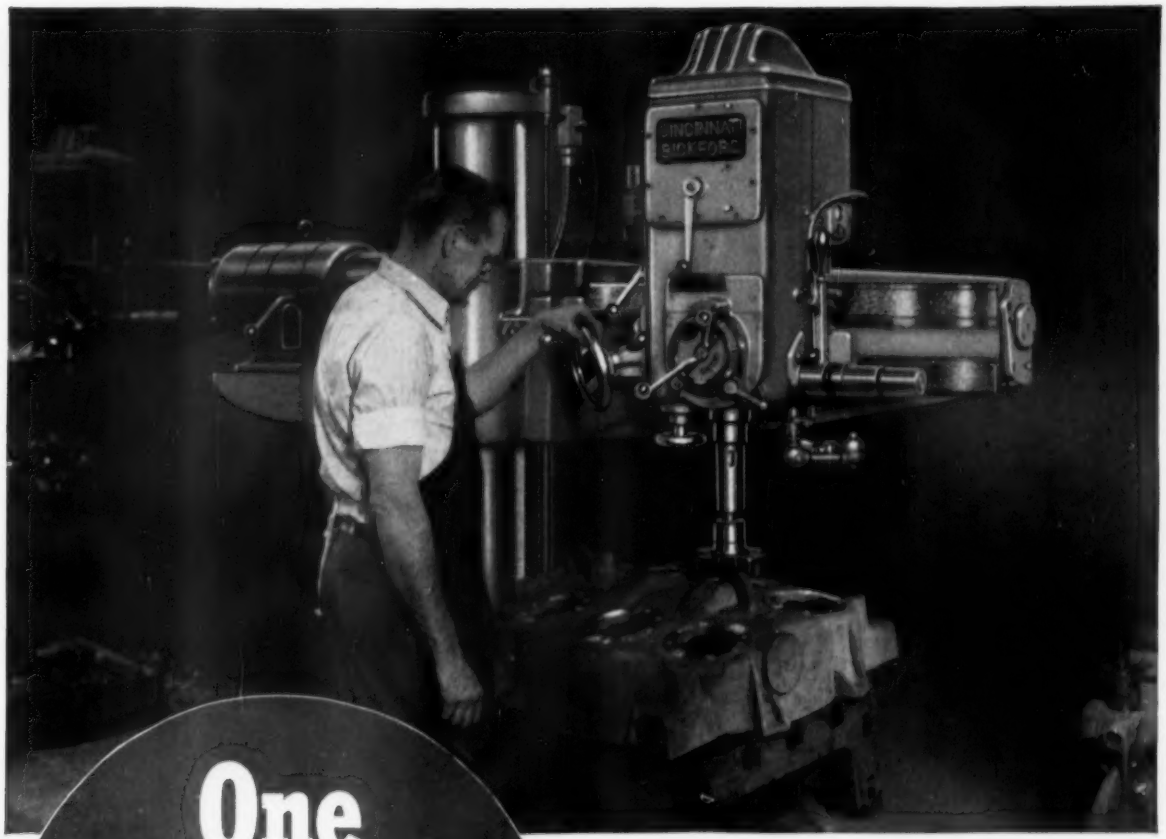
BURNISHING

FOR COMPLETE DETAILS SEND FOR BULLETIN DT-52

National Acme

THE NATIONAL ACME COMPANY • 171 EAST 131ST STREET • CLEVELAND 8, OHIO

←←← FOR MACHINING LARGE, HEAVY PIECES . . . get the complete ACME-RYDER story. Typical case history facts on preceding page.



One set-up saves 30%

Photos courtesy of the Kelman Electric & Mfg. Company, Los Angeles, California.

Boring, facing, and high speed drilling with one set-up cut the floor to floor time about one-third on this job.

The Kelman Electric & Mfg. Company say their Cincinnati Super Service Radial Drill "handles easily, is very accurate and versatile."

They are facing 6" diameters; drilling for ½" bottom tap, and tapping with a ½" bottom tap on this job.

The part being processed is a Bronze Top Casting.

Cincinnati Super Service Radial Drills are profit makers in this shop, and they could be in yours.

Write for Bulletin R-21C

CINCINNATI BICKFORD

SUPER C·B SERVICE

G&L

RADIAL AND UPRIGHT DRILLING MACHINES

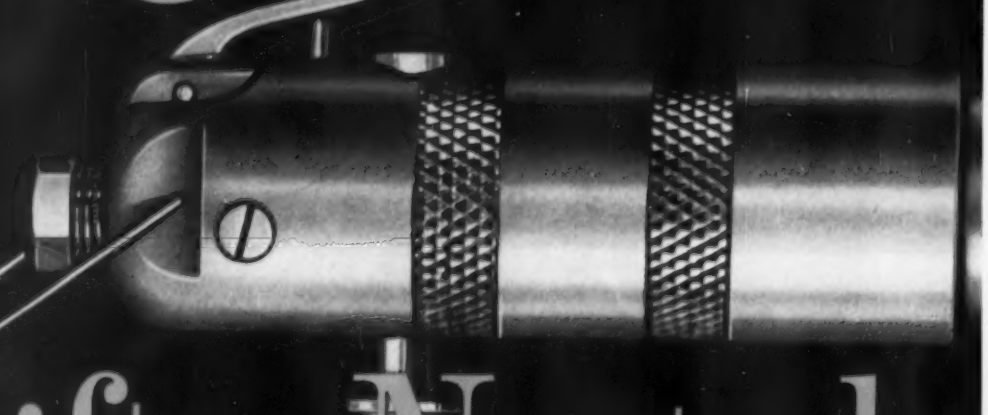
CINCINNATI BICKFORD DIVISION

GIDDINGS & LEWIS MACHINE TOOL COMPANY

OAKLEY, CINCINNATI 9, OHIO, U.S.A.

← ← ← FOR MACHINING LARGE, HEAVY PIECES . . . get the complete ACME-RYDER story. Typical case history facts on preceding page.

"Magnamatic"



Shifts to Neutral at desired torque

reduces work spoilage

"Magnamatic" is the only "One-Shot" type of Controlled-Torque screwdriver-nutrunner that has proven itself in two years of heavy-duty "on the line" service in industry! Typical of hundreds of satisfied users is a large mid-western company, whose 40 "Magnamatic" Screwdrivers-Nutrunners have:

- **Reduced bit breakage to 1/20th**
- **Reduced production delays**
- **Reduced rejects caused by damaged work surfaces**
- **Reduced noise levels from 83 to 68 db.**
- **Minimized screwdriver maintenance**

The instant a "Magnamatic" air-driven screwdriver-nutrunner reaches desired torque its automatic "One-Shot" clutch shifts to neutral. There's no harmful hammering, impacting or ratcheting to run fasteners past proper tightness and to damage surfaces, break bits, burr screw heads, strip threads or shear fasteners. And "Magnamatic" is *Quiet* . . . clutch buzz is eliminated and exhaust noise is muffled by a new principle of baffling. For complete details call your Chicago Pneumatic sales office or mail coupon.
Chicago Pneumatic Tool Company,
8 East 44th Street, New York 17, N. Y.

CAPACITIES:
#4 screws to ⅜" bolts.
Reversible and non-reversible types.

Chicago Pneumatic

Pneumatic Tools • Air Compressors • Electric Tools • Diesel Engines
Rock Drills • Hydraulic Tools • Vacuum Pumps • Aviation Accessories

Chicago Pneumatic Tool Company, Dept. M-32
8 East 44th Street, New York 17, N. Y.

☐ Please send me FREE booklet SP-3165 "Magnamatic" Case Histories

☐ Please send me "Magnamatic" Bulletin SP-3126

☐ Have representative call

Name _____ Title _____

Company _____

Address _____

City _____ Zone _____ State _____

Something more

than quality control...

makes *Hendey* lathes life-long money-makers in your toolroom or shop!

"We cannot produce a bad motor car. The guards would not permit it to leave the factory!" This statement was made by the executive head of Rolls-Royce, Ltd. Here at Barber-Colman Company, we sense the same devotion to perfection that marks the craftsmen who produce these fine automobiles.

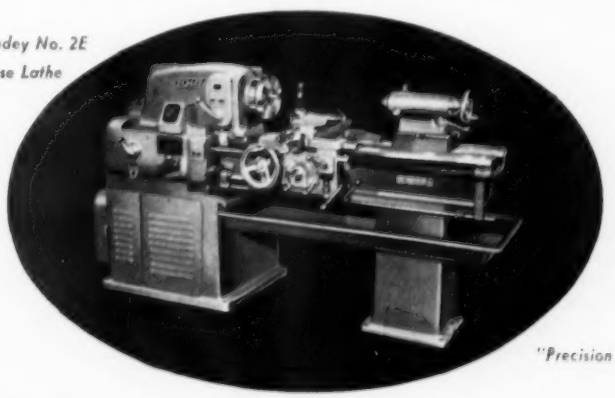
At the left you see the exclusive induction hardening machine which is used to harden all Hendey bed ways. The inspector is checking the hardness of the ways with the most modern electronic comparator. The ways for both the carriage and tailstock are integral with the bed and are precision ground after hardening. Greatest possible accuracy and maximum wear resistance are qualities of the finished ways.

We are proud of the quality we build into our machines — proud of the exclusive features that have been designed into them.

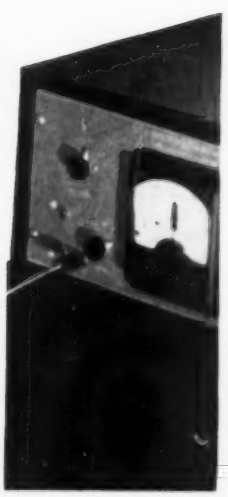
For example, our No. 2E 14 in. General Purpose Lathe is equipped with an *electronically controlled* drive that provides infinitely variable spindle speeds between 15 and 1500 rpm. This feature increases operator efficiency, produces higher torque at low speeds, and permits changing speeds smoothly while the machine is under load.

These and other Hendey features mean profitable operation on toolroom or production turning jobs. Your Hendey dealer will be glad to discuss your machining problem with you. Call or write him today!

Hendey No. 2E
14 in. General Purpose Lathe



"Precision with Production"



Hendey **machine division**
BARBER-COLMAN COMPANY
61A LOOMIS ST., ROCKFORD, ILLINOIS

BARBER COLMAN ®

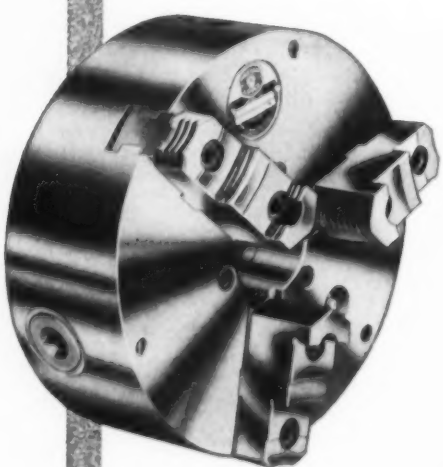
the finest precision lathes

Photo courtesy Hendey Div., Barber-Colman Co.

This is the NEW Hendey 32-Speed Geared Head Lathe which represents the finest in accuracy and production, in keeping with Hendey's long-standing reputation for the finest in lathes. Write the Hendey Div., Barber-Colman Co., Rockford, Ill., for complete information on this outstanding new lathe.

deserve the finest precision chucks

This is Horton's standard 3-Jaw Scroll Universal Chuck which has contributed to Horton's reputation for chuck leadership for over 100 years. Its precision and lasting accuracy make it a must in any production picture. For the complete story on the complete line of Horton Chucks, see the Horton people in your area now.



HORTON
Since 1851
CHUCK

WINDSOR LOCKS, CONN.

YOU GET A

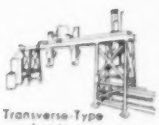
Two-Fold

CREATIVE AUTOMATION SERVICE

AT

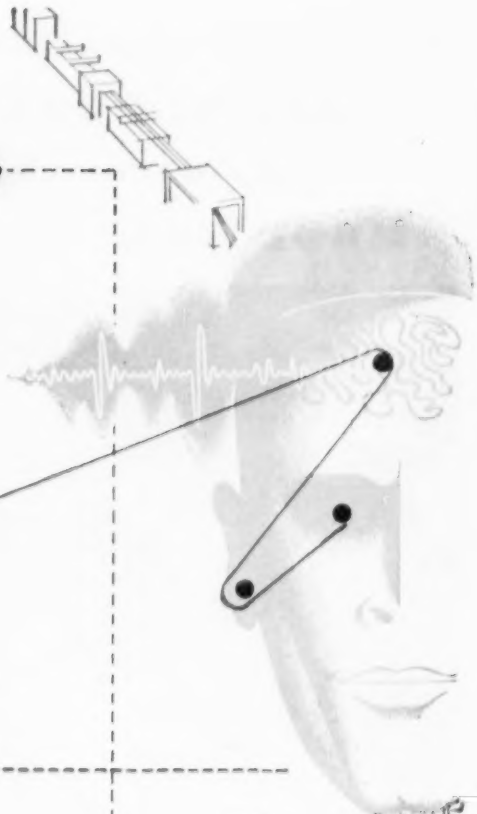
W. F. & JOHN BARNES®

Probe-Type Inspection Machine



Transverse-Type Loader

Metal Fastener Assembly Equipment



Now to better serve your needs and help you solve automation problems quickly, Barnes offers a two-fold coordinated service.

COMPLETE PRODUCTION-LINE ENGINEERING

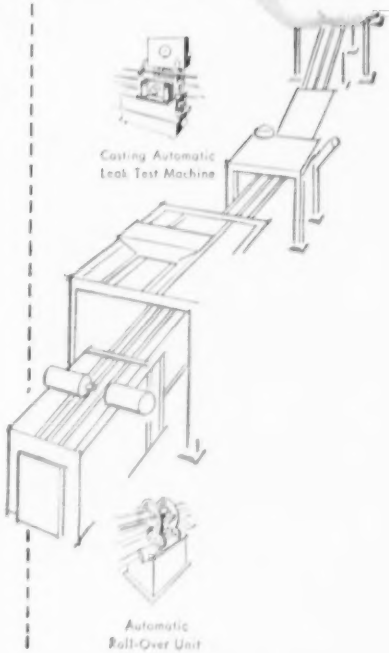
1 For new production line methods calling for either automatic or semi-automatic operations, you'll find at Barnes an experienced engineering staff to work with you. Detailed plans and proposals will be submitted for your consideration and can be depended upon to give you the latest in automation ideas and the very best of proven mechanical, hydraulic, and electrical actuation methods. Ask for a survey early in your planning program.

DESIGNING & BUILDING SPECIALIZED UNITS

2 The second and equally important part of Barnes two-fold service is the designing and building of specialized individual units to suit your specific needs. At Barnes you'll find a coordinated service where electrical, mechanical, hydraulic, fixture and tool engineers work together as a team. The combined efforts of a highly skilled and experienced engineering staff, coordinated with complete manufacturing facilities, help you save time by eliminating divided responsibility.

ASK FOR A METHODS ANALYSIS

Find out today why more and more Production Executives are turning to Barnes for a practical solution to their automation problems. We will be pleased to analyze your requirements, offer recommendations, and submit a cost estimate in a formal proposal if you so desire.



Casting Automatic Leak Test Machine

Automatic Roll-Over Unit

Builders of Better Machines and Equipment since 1872

W. F. & JOHN BARNES

AUTOMATION SECTION

413 S. WATER ST. • ROCKFORD, ILLINOIS

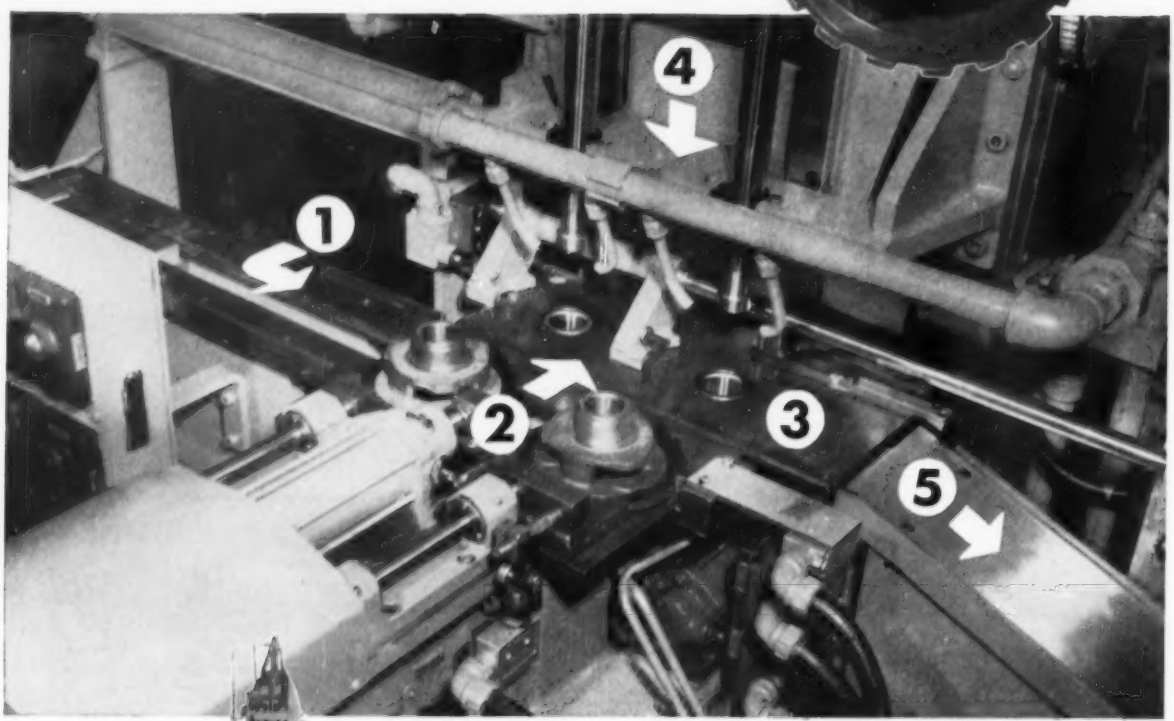
SPECIAL MULTIPLE SPINDLE MACHINE TOOLS • SPECIAL PROCESS EQUIPMENT • SPECIAL ELECTRICAL CONTROLS

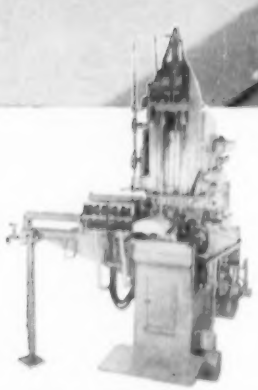
more about **AUTOMATION** by *American*...

SPLINE BROACHING

of transmission part

MADE FULLY AUTOMATIC





Fully automated broaching by American here results in an output of 380 parts per hour (at 100% efficiency). Regardless of what degree of automation you require, American is prepared to design and build the broaching machine, fixtures and broaches that will fit your production picture best. Write details of your requirements today.

1 Hydraulic fixture, interlocked to the machine cycle, transfers parts laterally, two at a time, from conveyor to position in front of the broaches.

2 Hydraulic pusher carries parts into broaching position.

3 An automatic skid plate then lowers and seats the parts over the thrust bushings.

4 Spline broaches, 36" long, are pulled down through the two parts, broaching 35 splines in the ID of the hub.

5 As skid plate rises, unseating the parts, hydraulic plunger ejects the parts down inclined chute.

ASK FOR CATALOG 450

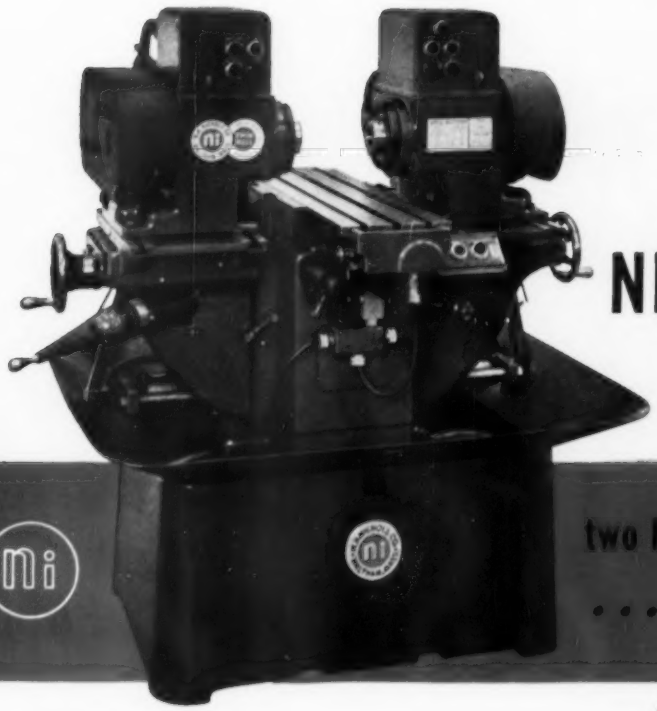
AMERICAN *American* BROACH & MACHINE CO.

A DIVISION OF SUNDSTRAND MACHINE TOOL CO.

ANN ARBOR, MICHIGAN

SUNDSTRAND

See *American* First — for the Best in Broaching Tools, Broaching Machines, Special Machinery



NICHOLS TWIN MILL

two heads are better than one ....for sure!

The Nichols Twin Mill is something new in duplex millers — a precision 2-spindle bed-type miller designed for simultaneous light duty milling of opposite or adjacent surfaces, using **horizontal or vertical spindles.**

The Twin Mill provides unmatched flexibility! It is equally adaptable for long-run or short-run jobs. The two geared milling heads are independent units, with separate 1 HP motor drives, and are quickly adjusted either directly opposed or offset longitudinally, vertically or transversely. Set-up is fast and simple.

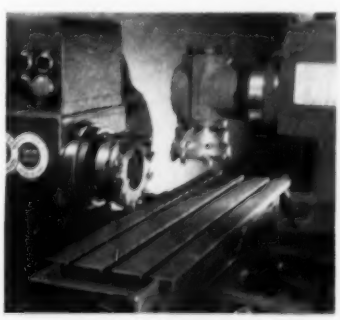
The wide range of spindle speeds from 55 to 2050 R.P.M. allows milling of ferrous or non-ferrous materials with high speed or carbide tipped cutters, producing EXTRA FINE FINISH while maintaining the closest tolerances with ease.

The Twin Mill is completely push-button controlled, arranged for automatic table cycling — with rapid approach, hydraulically controlled variable cutting feed and rapid return. Available with automatic retraction of milling heads, automatic spindle brakes and carefully engineered special features to meet specific applications.

The parts shown are typical of those on which the Twin Mill is cutting costs and boosting production. Investigate the savings it can make for you. For details write to Nichols-Morris Corporation.

CONDENSED SPECIFICATIONS

Table, working surface	8⅝" x 30"
Table Travel—cutting stroke	11¾"
Motors	(two) 1 HP
Spindle Speeds (15)	from 55 to 2050 RPM
Max. height center of spindle above table	11¾"
Max. offset of spindles (horizontal)	8½"
Max. distance between spindle noses (across table)	16"
Floor space required	64" x 56"



Manufactured by W. H. Nichols Company, 48 Woerd Avenue, Waltham 54, Mass.

76-F Mamaroneck Ave. NATIONAL DISTRIBUTORS **NICHOLS-MORRIS CORPORATION** **White Plains, New York**

best on every point

...and among high speed steels the top performer is REX

To leap the hurdle of competition, a product needs performance born of quality. And Crucible's REX® high speed steel has it – in accurate size . . . sound uniform structure . . . dependable response to heat treatment . . . optimum tool performance.

Now, thanks to improved manufacturing techniques, REX is even better – more uniform. Put it to work on your next job, and you'll quickly know why REX is today, as it has always been – *the standard by which all other high speed steels are compared.*

Call for REX at your local Crucible warehouse. Or order it directly for prompt mill delivery. And for a list of available data on REX and other Crucible *special steels,* write now for a free copy of the "Crucible Publication Catalog". *Crucible Steel Company of America, The Oliver Building, Mellon Square, Pittsburgh 22, Pa.*

CRUCIBLE first name in special purpose steels

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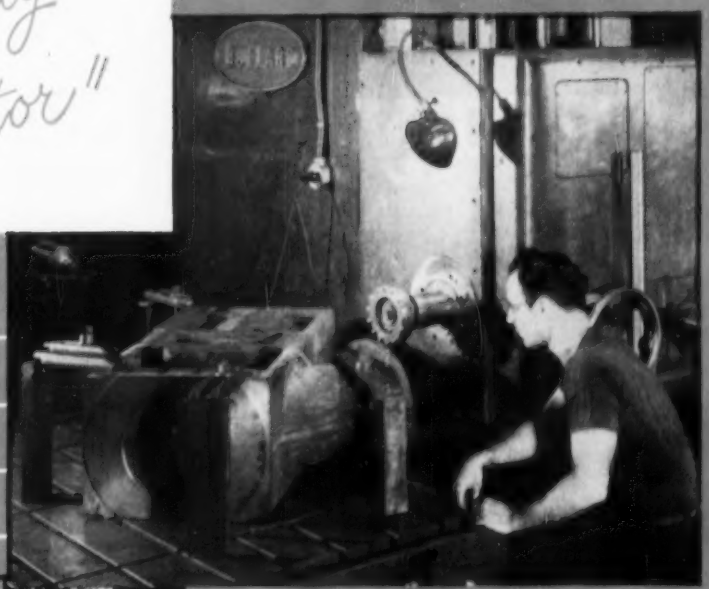
". . . the

BULLARD

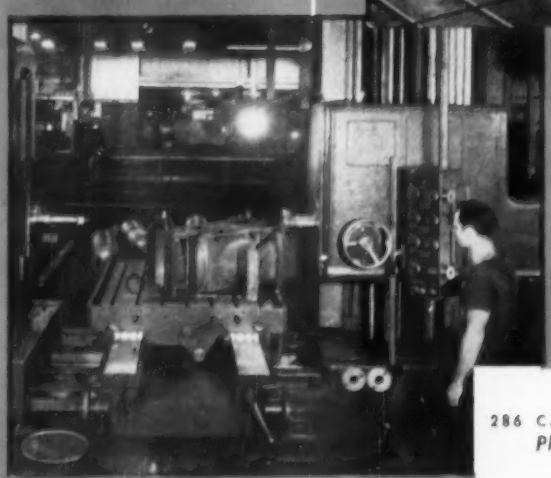
pendant control . . .

is sure handy for the operator"

Says boring mill operator at Fuller Company, Manheim, Pennsylvania, manufacturers of conveying equipment, coolers, compressors and vacuum pumps. Also, he says, "there are no levers to mess around with. On the Bullard H.B.M., Model 75, I can mill on a 45° angle in any quadrant instead of having to jockey in one direction, then in the other — like I had to do on the old machine."



the machine is outstanding for ease of operation



For full information on all the cost saving advantages offered by the Bullard Horizontal Boring, Milling and Drilling Machine, Model 75, including screw and rack feed, wide speed ranges, extra rigidity in Bed, Head, Head Post and Rear Post, optical measuring equipment (optional) and Automatic Positioning for head and table (optional),

CALL YOUR NEAREST BULLARD SALES OFFICE OR DISTRIBUTOR OR MAIL COUPON TO

THE BULLARD COMPANY
286 CANFIELD AVENUE—BRIDGEPORT 2, CONNECTICUT
Please send me a copy of the NEW H.B.M., MODEL 75 CATALOG . . .

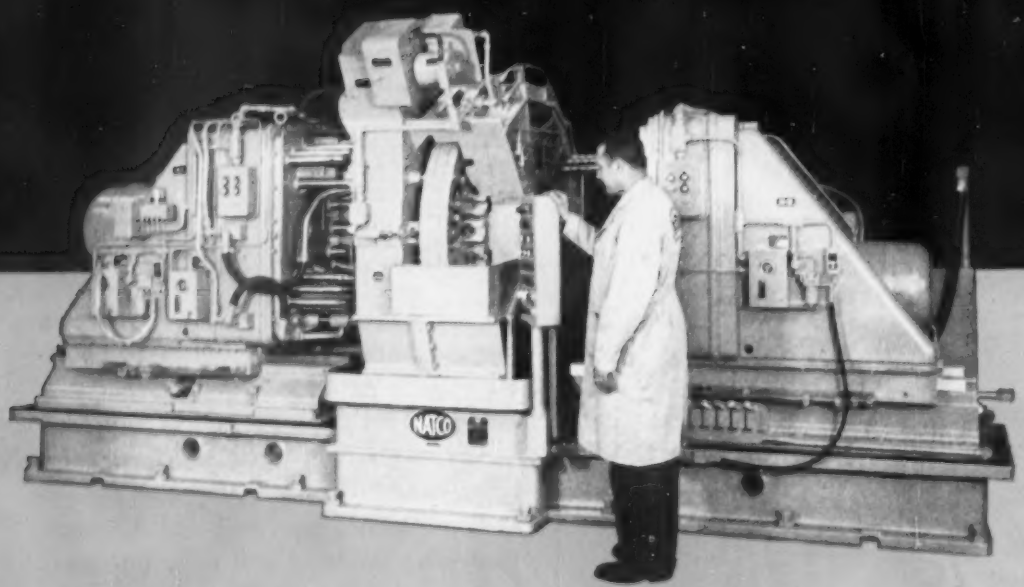
NAME _____

COMPANY _____ POSITION _____

ADDRESS _____

CITY _____ ZONE ____ STATE _____

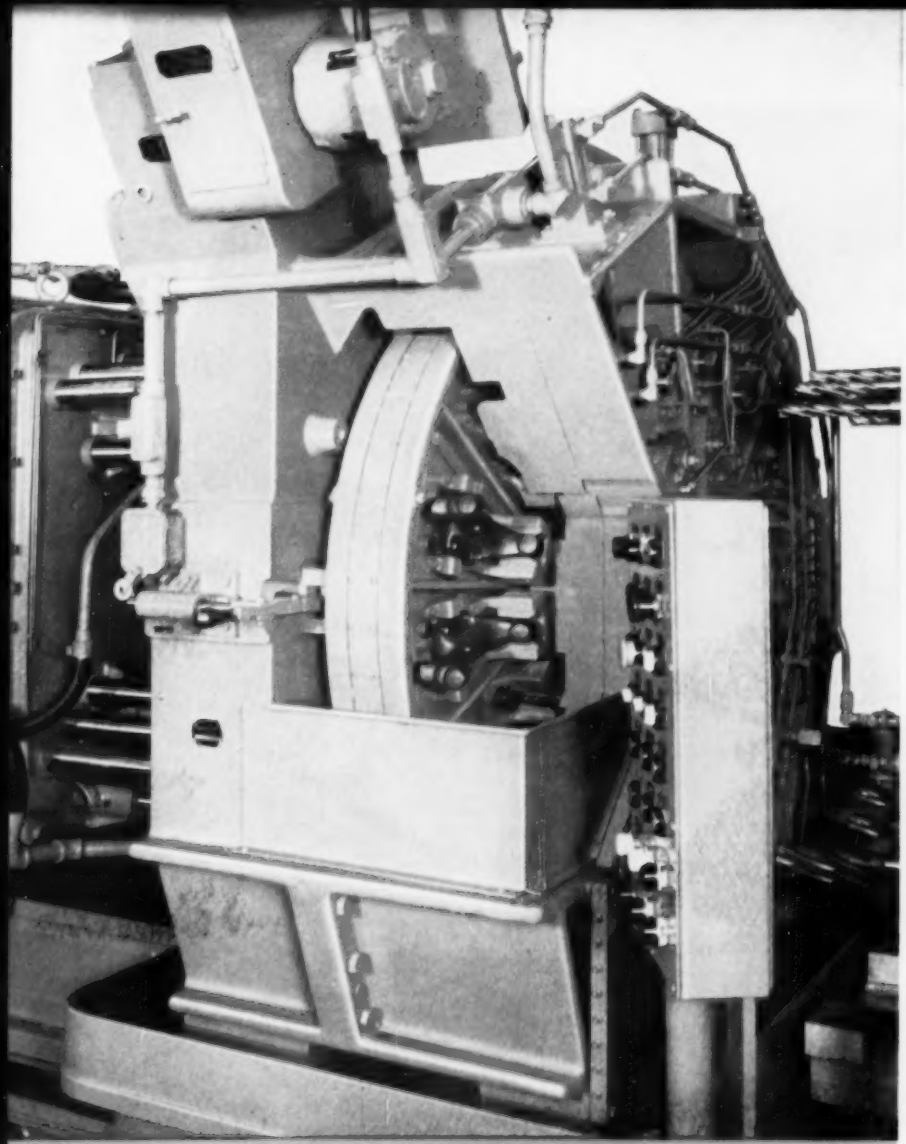
New Natco® Performs 17 Operations Every 15 Seconds



Performance—this Natco 2-way horizontal drilling machine produces 250 steering knuckles per hour. Holds limits as close as .004". Parts are clamped automatically in the interlocked trunnion fixture—spotdrilled, drilled, spotfaced, reamed and counterbored.

Features—Automatic time delay reverse, positive stop, coolant system with magnetic chip separator, automatic lubrication to heads and ways, hydraulic feed and J. I. C. compliance. Let a Natco field engineer help you with your drilling, boring, facing and tapping problems.

Ask for information about the PAYD (Pay-As-You-Depreciate) finance plan.



Notes from Natco...

Whole Hog or Piecemeal

Seems like two distinct approaches are being taken in the adoption of automatic assembly methods. The "whole hog" school favors abrupt change . . . wait until you can install a machine that will handle the *complete* assembly job. The "piecemeal" school favors a step-by-step transition, starting with the basic transfer mechanism and adding automatic stations one or two at a time.

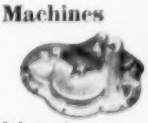
Variety Show

The critics say you can't have high production and versatility, too. But one of our eastern customers has run his drilling show that way for years. On seven adjustable multi-spindle Natcos, he drills and taps over 1000 different parts in lots from 50 to 10,000.

Shuttle for Speed

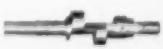
Like the Three Musketeers, drilling, chamfering and tapping go together. Natco is now building sliding tables for their small standard machines allowing all three operations with one push of the button. Starting in drilling position, table automatically indexes for chamfering and tapping; then returns. Up to 24 operations at a crack.

Processed by Natco Machines



Part: Gear Housing
Machine: Natco vertical Holesteel
Operations: Drill 11 holes; Counterbore 1 hole; Chamfer 3 holes; End cut ream 1 hole; Combination ream, face and chamfer 1 hole; Ream 3 holes.
Production: 90 per hour

Part: Cylinder Block
Machine: Natco Holesteel
Operations: Drill 17 holes in 4-cylinder block or 23 holes in 6-cylinder block.
Production: 40 parts per hour



Part: Shaft
Machine: Natco H-5
Operations: Combination drill and chamfer 3 holes; Drill 4 holes.
Production: 80 parts per hour

NATIONAL AUTOMATIC TOOL COMPANY, INC.
Richmond, Indiana

Multiple-spindle drilling, boring, facing and tapping machines
Special machines for automatic production

NATCO

Call Natco offices in Chicago, Detroit, Buffalo, New York, Boston, Philadelphia, Cleveland and Los Angeles; distributors in other cities.

Ask **FEDERAL** *First*

FOR RECOMMENDATIONS IN MODERN GAGES . . .

Dial Indicating, Air, Electric, or Electronic — for Inspecting, Measuring, Sorting, or Automation Gaging

STABLE ACCURACY

The Most Important Requirement In Gaging

The basic design of the Dimensionair is different from that of any other Air Gage. It "repeats" measurements precisely and constantly hour after hour because —

1. The Dimensionair's balanced air system cancels out pressure variations which might affect it and cause errors.
2. Unlike other air gages, there is no adjustment in the magnifying-measuring side of the system. Rather than introduce a variable here which would make a fixed system impossible, Federal offers two magnifications which answer practically every requirement. These magnifications are 2500 to 1 and 5000 to 1. In this way, Federal achieves a stability which cannot be approached by other air gages.
3. Because the magnification is fixed, the scale is linear and the graduations can be accurately calibrated.
4. Hence, with no adjustment to change the magnification and affect the stability, only a single master is required.

Try It!

Check a Dimensionair yourself right in your own plant. Compare it with your present air gages.

a. **Check it for stability** or "repetition". Do this frequently and over long intervals, always using the same master. Avoid temperature effects (excessive handling, direct sunlight, etc.) Notice how quickly you can set the gage to zero.

b. **Check its calibration** using any number of masters. Confirm the fact that only one master is needed. See how dependable the Dimensionair really is.

Ask us or our salesmen to let you try a Dimensionair

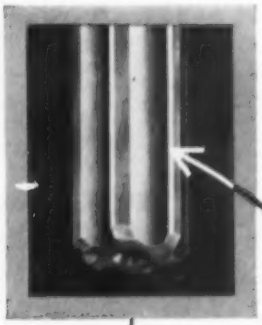
Federal Products Corporation
6126 Eddy Street • Providence 1, R. I.

We'd like to test a Dimensionair in our plant.

Company Name _____

Your Name _____ *Title* _____

Address _____



This edge cuts reaming costs

L+I gives you the edge on production

Call your L+I distributor

The Reamer Specialists

L&I

LAVALLEE & IDE, INC.
CHICOPEE, MASS.

Backlash

SEND LETTERS TO:
BACKLASH EDITOR American Machinist
330 W 42nd ST, N Y 36, N Y

Prosit

We have read with much interest the reportage of your Bonn agent on the German machine-tool industry (*AM*—Mar 26 '56, p140). I think this report is a very correct one and shows the situation in full truth. It is, in fact, a satisfaction to see that somebody is qualified, not only to see things as they are, but also to stick to pure facts — which for a newspaperman is not always easy. But I can tell you that your man has done a nice job in a nice way.

Business is still flourishing at top level in this country, mainly due to the enormous construction of housing facilities, public enterprise, and private industrial initiative. There is a lot of talk of inflation danger, but I personally believe a good deal of this is brought about intentionally to cover individual and egocentric interests. So long as people go on working hard and production continues its average 12% annual increase, I don't think there is too much danger. Unless, of course, State officials are too generous in expenditure—and the enormous tax-income is indeed rather an inducement to this.

For the time being, our company is taking its share of the boom and, provided peace is maintained, I sincerely hope to recuperate, also privately, a little of the lost past.

E K
Hamburg, Germany

All On The Surface

Superficiality is the keynote of the age in which we live, and the young engineer has not escaped its implications. To begin with, most of them today are superficial in their concept of basic principles, not only in respect to engineering, but also in respect to principles which should underlie every important move made in a lifetime.

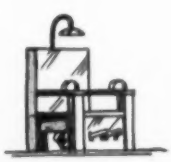
So, what do we get? We get machine operators in place of machinists —we get technicians in place engineers—and everyone bows down at the altar of phoniness. What are the young engineers mainly concerned with today? Well, one of their main concerns is unionism, and I think it is something which your technical editors could well take a crack at, because unionism and professionalism are two separate masters, which no one man can serve.

I have had the job, through the years, of hiring thousands of these alleged machinists, and hundreds of the alleged engineers, then finding that I have to set up a school to

GRINETICS

By D G SMITH

COMPOUND INTEREST



ELECTROLIMIT

SINE-BAR

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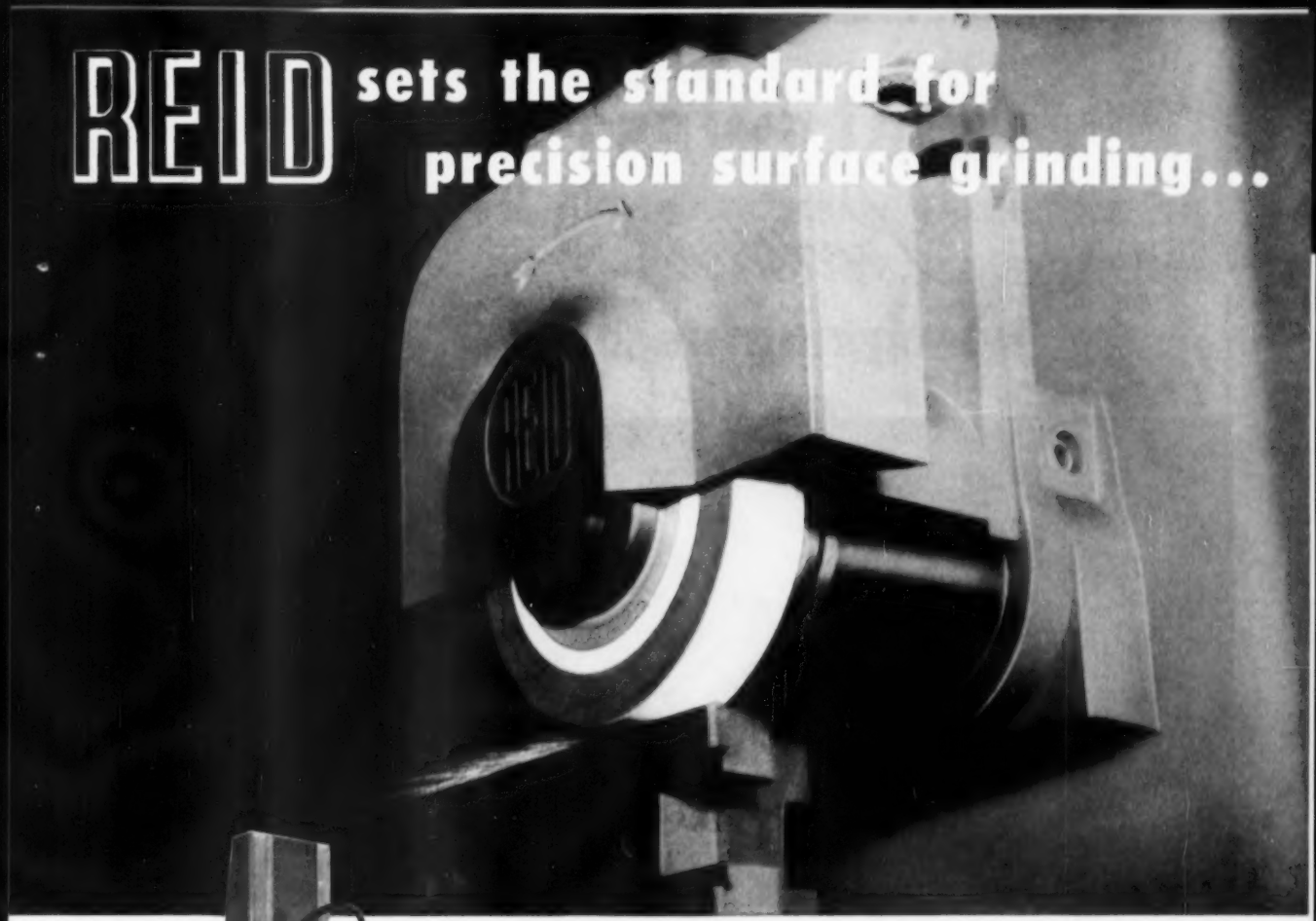
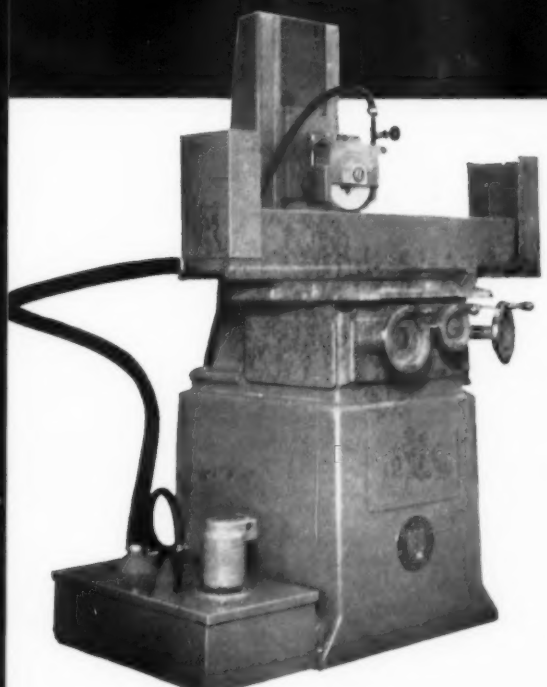
REID sets the standard for precision surface grinding...





MODEL 618H convenient finger-tip level controls for all operations make this grinder the favorite of the toolroom for the finest tool and die grinding. Accessories, including Cool-Grind or wet grinding attachments, magnetic chucks and form dressers give extreme versatility for all operations.

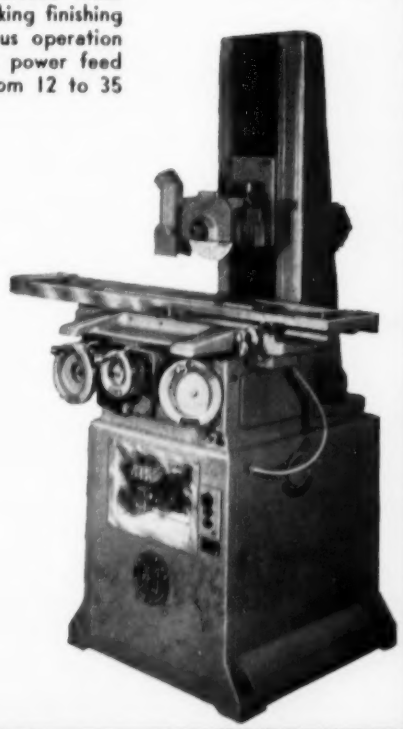
MODEL 618VL designed for precision grinding to the finest tolerances with superior surface finish . . . rugged construction and painstaking finishing give true dependability for continuous operation with minimum maintenance. Features power feed table with traverse speed variable from 12 to 35 feet per minute.

SPECIFICATIONS

CAPACITY: 6" wide, 18" long, 17¼" high from spindle center to table.
WORKTABLE: 51" x 8" overall.
FEED RANGE: Elevating hand wheel (r.) graduated to .0005" (optional, vernier to .0001"); cross feed to .001"; power cross feed adjustable .006" to .100" at either or both ends of table reverse.
GRINDING HEAD: with 3" opening for standard 1 h.p. cartridge type motorized spindle. Wheel size: 7" x ½" x 1¼".
FLOOR SPACE: 71" x 43½"
WEIGHT: 2100 lbs. net

Write for Bulletin 618-1

Photo courtesy of Robertson Mfg., Co



Reid Brothers Company, Inc.

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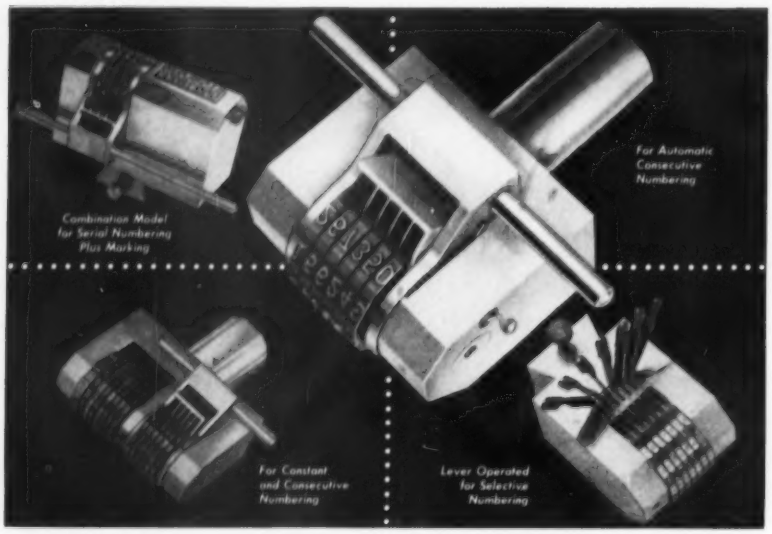
1 2 3 4 5 6
1 2 3 4 5 7
1 2 3 4 5 8
1 2 3 4 5 9
1 2 3 4 6 0
1 2 3 4 6 1
1 2 3 4 6 2

NOBLEWEST

Precision

NUMBERING HEADS


Combination Model for Serial Numbering Plus Marking
For Automatic Consecutive Numbering
For Constant and Consecutive Numbering
Lever Operated for Selective Numbering

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1 2 3 4 6 4
1 2 3 4 6 5
1 2 3 4 6 6
1 2 3 4 6 7
1 2 3 4 6 8
1 2 3 4 6 9
1 2 3 4 7 0
1 2 3 4 7 1
1 2 3 4 7 2
1 2 3 4 7 3
1 2 3 4 7 4

FAST, accurate and dependable, Noblewest Numbering Heads are preferred by the leaders in industry. They have unlimited applications for *constant, selective* and *consecutive* numbering. Designed for use in either marking presses or Noblewest Roll Marking Machines—wherever permanent numbering is required. Available in a wide variety of automatic, non-automatic and lever operated models with number sizes from 1/40" to ½". Special numbering heads are made to any requirements including embossing heads and numbering heads combined with marking dies.

If you have a numbering problem in steel or other metals—wood, fibre, hard rubber, plastic—save time and money with Noblewest Numbering Heads. There is a Noblewest Representative near you. Write to Noble & Westbrook Manufacturing Company, 17 Westbrook Street, East Hartford, Conn.

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NOBLEWEST

MARKING MACHINES • MARKING TOOLS

teach the machinist how to use a micrometer, and teach the alleged engineers the first-year theories of applied mechanics.

Now someone proposes to break down the system some more and inject some more superficiality into it, and I am just about ready to quit.

The Armed Services have been going through the same silly Gethsemane, selling these beautiful little boys on the virtues of wearing a fancy uniform and making a sightseeing tour of the world, instead of selling them on the need to do their duty by their country. To what heights can this hysteria of superficiality carry us? Today we have to man the Services with draftees who don't want to serve, simply because some dope up at headquarters thought he could make these Mama's boys into men by feeding them "lollipops." And now the machinery industry seems to have been bitten by the same worthless bug.

R H
New York

High Voltage

In our recent article on welding gas-turbine alloys (AM—May 7 '56, p123) *we reported the voltage for use with 1/16 to ⅛-in. electrodes as 110 v. This should have been 24 v. We would also like to apologize for inadvertently referring to Westinghouse as a Co, rather than a Corp.*—Ed

What is an Apprentice?

After reading your interesting editorial, "Is Apprenticeship Obsolete," (*AM*—April 23 '56, p111) I feel obliged to take issue with Mr. Rowntree. I have always had the greatest respect for Brown & Sharpe, and have always held that a certificate awarded to a B & S apprentice upon completion of his training was an automatic passport to a top-grade job in virtually any machine shop in the country.

I am afraid Mr Rowntree is barking up the wrong tree when he suggests abolishing the word, "Apprenticeship," on the grounds that "young men are not being apprenticed to a particular shop job." They never were. A young man is apprenticed to a trade, and if he is to become a skilled tradesman, he must know every facet of that trade. And

he can learn it only by thorough training as an apprentice.

I will agree that some streamlining may be desirable, and that fixed periods of training are not always necessary. One youngster may become proficient on a drillpress after six weeks, another may need three or four months to acquire equal facility. But it is not sufficient to teach a boy the "general mechanics" of any job. Otherwise, what is he going to do when he comes up against a job that is out of the ordinary? Not every shop is equipped with the most modern machines that will do the thinking for him. And if the fast-disappearing breed of old-time machinists is not to pass along the accumulated experience of past generations, who will be able to train our grandsons?

I would abolish the old-fashioned idea of humiliating the beginner by making his sweep the floor for his first three months—although it's damn good discipline—and I would favor treating him with some respect as a future craftsman; but abolish formal apprenticeship — never.

John R W Bevitt
Boston

Short Beer Please

Re your reference to the Kruschchev Cocktail (*AM*—May 7 '56, p119) permit me to give you the real recipe:
3 parts Vodka (90 proof)
2 parts Gin
1 part Absinthe (real)
1 dash lemon juice (small)
1 dash Bitters (large)
1 dash Cherry Heering
Stir mixture with Siberian ice cubes. Serve in chilled beer glasses.

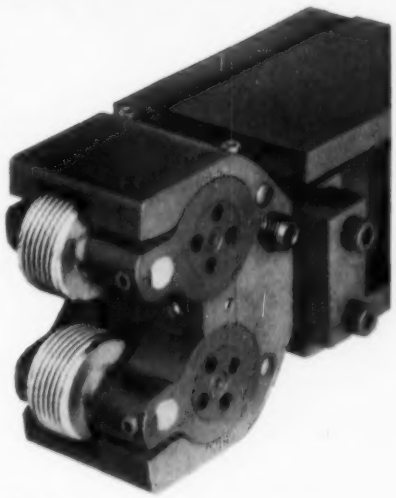
J F J
New York

Reduce Threading Costs
on AUTOMATIC SCREW MACHINES ... with

NEW SERIES B

REED

Thread Rolling Attachments



A multi-purpose tool of wide range for rolling machine screw threads, straight and taper pipe threads (including dryseal), annular rings, oil grooves, knurling and other cold forming operations. Eliminates secondary operations by rolling behind shoulders.

- For over 100 different single and multiple screw machines
- Adapters for more than 300 cross-slide applications
- Easy to set up and operate
- Simple precision matching with pre-matched rolls
- Dovetail clamping arrangement simplifies setup by permitting head to be removed from adapter

SELF-COMPENSATING ROLL ACTION simplifies setup, provides longer roll life and reduces down time to a minimum. The ***side and alignment compensators*** ease undesirable side pressures on the rolls and assure smooth contact and withdrawal from the work. The ***advance compensator*** allows rolls of the same diameter to be used and permits either roll to contact the work first.

FOUR STANDARD SIZES

Model No.	Complete Diameter Range	*Pipe Threads That May Be Rolled	Approximate Number of Common Screw Threads That May Be Rolled
B 10	0 - 5/8"	7	80
B 13	1/8" - 13/16"	9	90
B 18	1/4" - 1 1/8"	15	105
B 36	3/8" - 2 1/4"	18	185

*Straight and Taper Pipe Threads, including Dryseal (NPTF). Change may be made from Straight to Taper Threading by changing rolls only. No other equipment is necessary.

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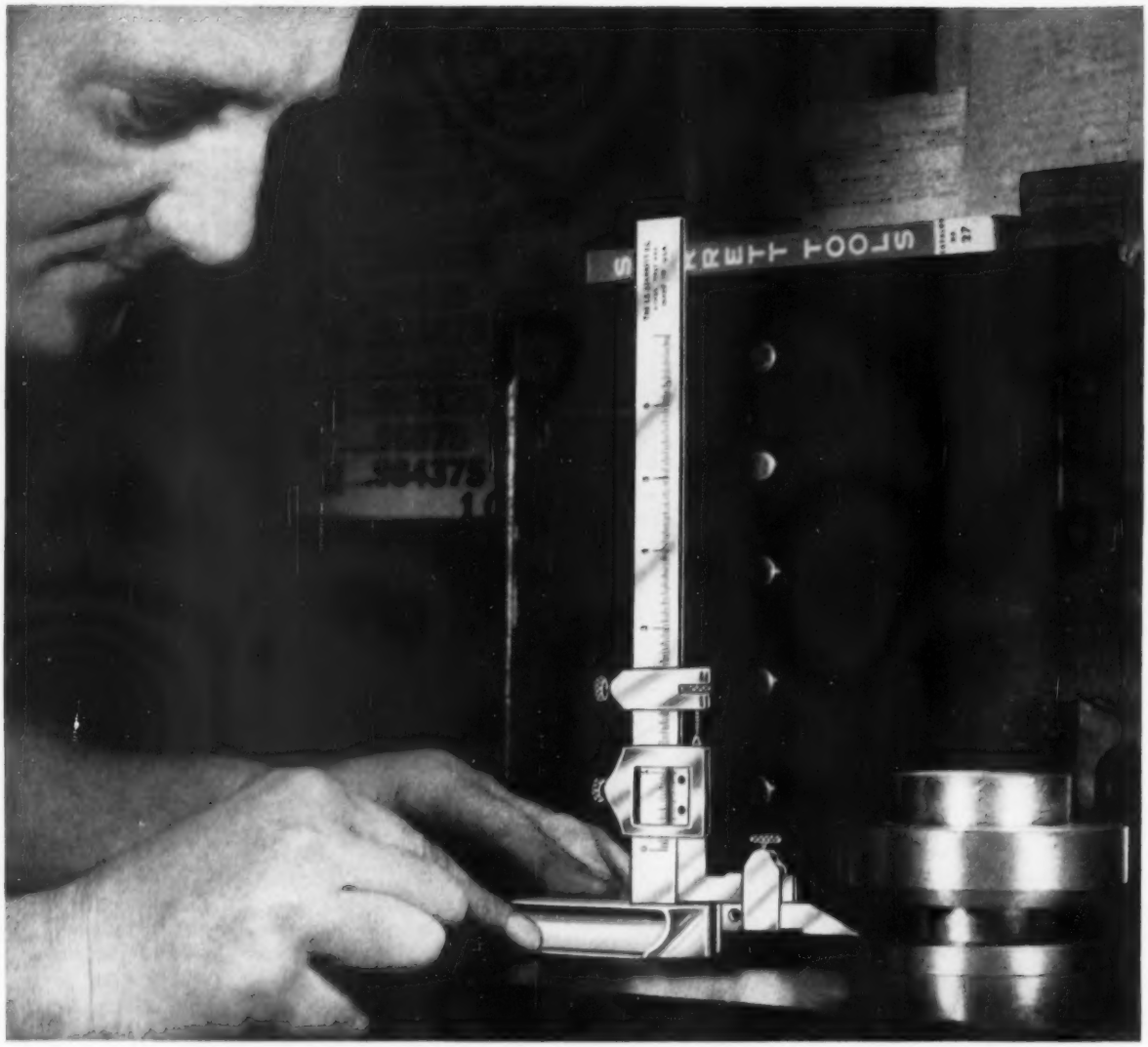


NEW Starrett HEIGHT GAGE

with slotted base that saves costly errors

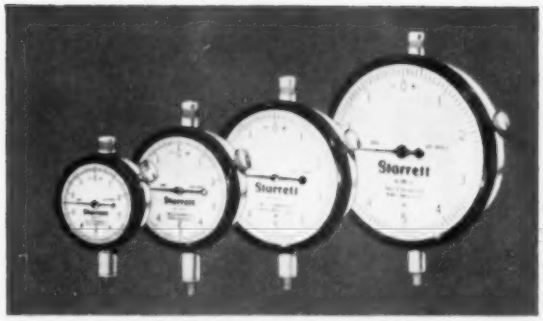
Toolmakers, inspectors and layout men especially appreciate this new Starrett No. 354 Series Vernier Height Gage. With it, they can measure or scribe lines close to the base surface without calculations that frequently introduce errors.

The secret is a new slotted base plus a 7-inch scale that permits direct readings over the full range of 0 to 6 inches.

Your men look to Starrett precision measuring tools and instruments for features that save time, promote accuracy, and simplify precision work. They have the same high regard for Starrett dial indicators, steel tapes, hacksaws, hole saws, band saws, band knives and precision ground die and flat stock.

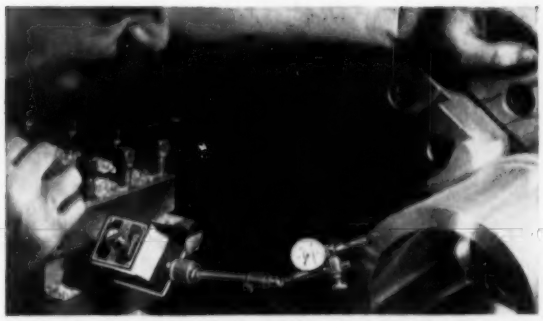
All of these precision-made Starrett products are available through one convenient and reliable source of supply — your INDUSTRIAL SUPPLY DISTRIBUTOR.

WHEN YOU MEAN PRECISION YOU SAY STARRETT



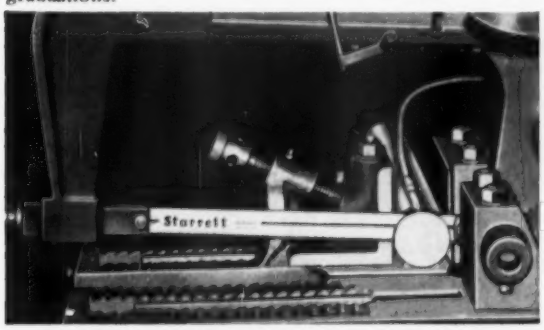
NEW HIGH-PRECISION, LOW-FRICTION INDICATORS

Featuring simplified construction; easy reading, eggshell finish dials; no-glare Satin Chrome Finish on case; black bezel. The complete line with 140 models to meet all requirements includes regular or nonshock types, balanced or continuous dials, jeweled or plain bearings, English or Metric graduations.



NEW MAGNETIC BASE INDICATOR HOLDER

No. 657 with off-on push button for one-hand operation has universal adjustment including sensitive fine adjustment. Holds firmly to any iron or steel surface. Mounts any "Last Word," No. 196 or No. 25 Series dial indicator.



NEW PRODUCTION-PROVED HACKSAWS

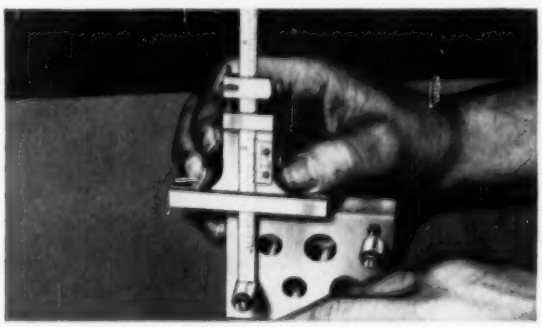
Production-proved to give you better cutting performance, longer blade life . . . color identified to help you select the right blade for any job. These new Starrett faster-cutting, longer-lasting hacksaws are now available through your Industrial Distributor.

NO. 167 STAINLESS STEEL RADIUS GAGES

Made of stainless steel — rustproof and stainproof — satin no-glare finish. Each gage has five gaging surfaces for convex and concave radii. Available in six convenient sets. Handy gage holder also available.

PRECISION GROUND DIE AND FLAT STOCK

Over 1000 sizes precision ground to Starrett standards of accuracy. Available in oil, oil and water, water or air hardening types. To save valuable man and machine hours, just "lay it out . . . and saw it out."



NEW VERNIER DEPTH GAGES

No. 448 Series have extra capacity with new, longer blades permitting full 6" or 12" readings. Available with 6", 12" or 6" and 12" blades. English, Metric or English and Metric measure.

BIG NEW CATALOG NO. 27

Describes and illustrates the complete Starrett line.
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It's easy-to-look-at! More than 200 pages are specially edited and arranged for quick and simple reference. Full color is used to make tables easier to read, illustrations more clear. The easy-to-look-at format plainly indicates all optional features. Covering the complete Danly "Leadership Line", this catalog presents full dimensional data and specifications for all Danly Die-Sets, Diemakers' Supplies, Bolster Plates and Bolster Plate Accessories. Get your copy of this new easy-to-look-at Danly catalog. *Write for it today.*

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Spot news...

- **Precision titanium forgings from Canada are being advertised in U S newspapers** at "the lowest prices in the world" by Canadian Steel Improvement Ltd.

- **Five-year research project on gating and feeding of malleable castings** will be completed shortly by the Malleable Founders' Society. New projects to come: one on basic properties; high-temperature properties; corrosion properties.

- **Russia is interested in buying complete manufacturing plants from Britain,** according to British Minister Duncan Sandys, just returned from Russia. Type of plants desired was not revealed.

Air Force will shortly take these machine tool replacement steps: (1) dispose of pre-1941 tools needing repair; (2) dispose of 1941-1946 tools costing 25% or more of value to repair; and post-1946 ones that will take 35% of value to fix. Repair ceiling has been fixed at $3500 per machine. (See p103.)

- **Cleveland area UAW-CIO officials are threatening a mass march on the Ohio** state Capitol to force state officials to approve private supplementation of unemployment compensation. Ohio is one of three holdout states.

- **"No raises and no shortening of hours if you don't produce"** is the gist of a proposal made by German employers to labor leaders. The proposal: a joint labor-management committee would study working conditions, possibility of automation, labor market conditions, etc, for any given industry or company, then decide whether wages should be raised and work hours cut.

UAW-CIO is sparking a worldwide movement to bring about "equalization of economic conditions" in Ford and GM plants throughout the world. Crux of the plan: to establish a 40-hour workweek in Europe, and a 32-hour week in U S plants that already are on 40-hour weeks.

- **First cutting tool with ceramic tip bonded to a steel shank** is being marketed in standard ½ x ½ x 3½ in. size by Raybestos-Manhattan Inc.

- **International congress on automation and its problems** was held in Vienna last month with speakers from several Western European nations and the U S discussing both the social and technological worldwide aspects of automation.

- **All Plymouth bodies will be fabricated, assembled and painted under one roof** in a streamlined operation when the company moves its Meldrum Ave operations and personnel to its Mack Ave plant in Detroit. First transfer will be of station-wagon body operations—possibly this October.

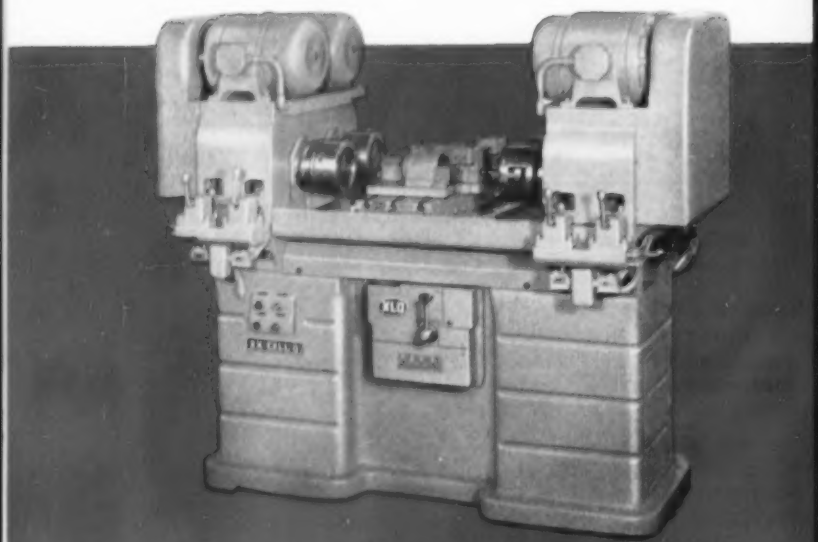
- **West Coast firm that warehouses and delivers aircraft aluminum extrusions** as its specialty stocks more than 2000 different shapes—each of them certified to conform with government specifications.

- **Government's policy of renegotiation of defense contracts** is under sharp attack by West Coast industry for "penalizing efficiency while accomplishing nothing toward protection of the public purse." Also rapped: government refusal to give small business "progress payments" equal to those for larger firms.

- **Index of West Germany's comeback as an international investor:** since 1952, German firms have invested more than $250 million in plants abroad. Heaviest investments are in Brazil, Canada, and France and its colonies.

MAXIMUM PRODUCTION SPEEDS — LOWER COSTS WITH THESE MODERN

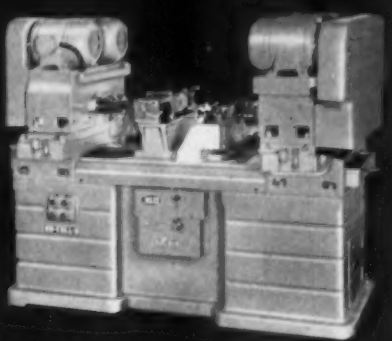
Ex-Cell-O Precision Boring Machines



STYLE 1212-B. For identical or different operations at each end. When loading time of parts approximates the time of machining, a double-end machine practically doubles production.

STYLE 2112-B. Single-end model for work pieces in the small and medium-size range. Flexible hydraulic controls give easy adjustment of work cycle.

STYLE 112-D. Large and sturdy with long stroke. Accommodates medium and heavy work, gives maximum precision production, minimum operating cost.



STYLE 17-A. Massive construction. Maintains the highest precision standards on a profitable production basis. Economical in operation, can be tooled for a wide range of production jobs.

These versatile Ex-Cell-O Precision Boring Machines bore, turn, face, counterbore, chamfer and groove.

Whichever model fits your production requirements, you'll find this large variety of precision operations will lower your costs—increase your profits.

All Standard Ex-Cell-O Precision Boring Machines can be equipped for work handling and ejecting operations, thus providing fast, automatic production at minimum cost.

Contact your local Ex-Cell-O representative who will provide all the facts about these machines, or write to Ex-Cell-O for a precision boring catalog.

56-16

XLO EX-CELL-O for PRECISION

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MANUFACTURERS OF PRECISION MACHINE TOOLS • GRINDING SPINDLES • CUTTING TOOLS • RAILROAD PINS AND BUSHINGS • DRILL JIG BUSHINGS • AIRCRAFT AND MISCELLANEOUS PRODUCTION PARTS • DAIRY EQUIPMENT

Washington ... NEWS REPORT

Fast tax writeoffs knocked . . .

Senator Paul Douglas' Joint Congressional Committee on the Economic Report has scored the use of accelerated tax amortization under the government's program to expand defense-related facilities. In a new report, the committee sharply criticizes the increasing quantity of five year writeoffs granted by ODM. Actually, the agency curtailed much of the program last August. But, according to the report, fast writeoffs covering $2 billion worth of facilities have been issued in first quarter 1956—the highest quarterly rate since January-March 1952. Of this sum, $1.4 billion, or 70%, was approved for accelerated amortization. The percentage is the highest since the program began in late 1950.

Top industries covered in the last quarter were electric utilities (which accounted for more than one-third of the $2 billion worth of new plant expansion), railroad transportation and oil and gas. The report cited ODM's announcement in April that the volume of new writeoffs would fall off rapidly, pointed out that in the month following the announcement ODM granted writeoffs covering $500 million worth of plant expansion.

New Mobilization Register . . .

The Pentagon will issue an updated *"Register of Planned Mobilization Producers"* next month. This is the master list of industrial plants—mainly metalworking of one type or another—lined up to produce top-priority military goods in case of war.

The new list will contain almost 21,000 plants—about 10% less than the current Register. Plants knocked off the list are ones which have merged with other firms, changed product lines, gone out of business, or ones who have failed to keep in touch with the Defense Dept's industrial mobilization program.

Although the Register is set up for all-out mobilization production, it counts, too, in current military procurement. Plants listed figure in all negotiated procurement of equipment they're qualified to produce. In addition, they're sure to be solicited for bids in advertised procurement, and frequently rate preference in contract awards for mobilization planning purposes.

Here are tips from Pentagon industrial mobilization planners on what to do to stay on the list: keep your capacity surveys up to date in the files of the "Armed Services Procurement Planning Officer" to whom your plant is assigned. Check on renewals of your tentative production schedules—the so-called "phantom orders." They expire from time to time. Bring your facilities to the attention of other military services. You can sell for current production or make mobilization plans outside your Procurement Planning Officer's branch of service.

The Register is a classified document. But you can check your individual entry—if any—with the ASPPO. If you're not sure who he is, you can find out at any major regional military procurement office.

Renegotiation extension . . .

Extension of the Renegotiation Act for three years—with some new exemptions—has been recommended by the Joint Congressional Committee on Internal Revenue Taxation. The committee proposes that the minimum government business covered by renegotiation be boosted from $500,000 to $1 million and that the standard commercial article exemption be widened. Right now, only items that are bought by the government under "competitive conditions" are covered by the exemption. The proposal would knock out the factor of competition, would rule that standard commercial articles are those "customarily maintained in stock or covered by established price quotations." Odds are Congress will go along with the committee's recommendation.

New Nickel controls . . .

Nickel shortage has Washington taking every measure short of broad government controls to ease the high price market pinch on small users.

ODM has put all nickel alloys on allocation basis under the Defense Materials System. This affects only defense contracts, will not change the civilian picture, according to ODM.

After hearing small users—mostly platers—and some suppliers tell of (1) users getting more nickel than they need by claiming it for defense orders and (2) gray market prices up to three times the going price, Senate Small Business Committee Member Wayne Morse pushed through an amendment to the two-year Defense Production Act extension giving the government broader power to slap allocation controls on all nickel.

ODM Director Flemming and Commerce officials, however, told Congress they see the solution in recent production expansion goal stimuli announced by ODM, rather than in controls on end-use products.

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and precision performance

In servicing and in reassembling, screw thread fastenings are superior. In outstanding tap performance, it's BAY STATE that is superior.

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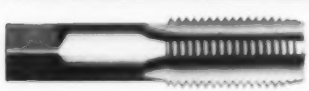


BAY STATE TAP & DIE COMPANY
MANSFIELD, MASSACHUSETTS

On the nearby shelves of your Industrial Supply Distributor

Detroit ... NEWS REPORT

Major styling changes every year?

That's the word around Detroit these days, where they're saying that the enormous resistance of new car buyers to 1956 models has sparked a turnabout in automotive moguls' thinking. They want no repetition of this year's fiasco and the best way to insure that is to junk the usual two or three year styling changes in favor of a major change once a year—and that means new tooling on a big scale every year.

Opponents of the idea say it'll be so costly the little automakers can't afford it. Others say no one in the industry could keep up yearly changes for long: that a two-year cycle with major facelifts in the off-year would give companies a little time to take advantage of tooling expenditures.

Whatever the decision is, the tooling people can look forward to more auto industry spending—because styling sells cars, and styling requires tooling.

Doldrums in Detroit . . .

With extra-long Memorial day furloughs, the auto industry cut back production for the week ending June 1. Chrysler hit its lowest level for the year the week before that with a 58% drop in Chrysler output. Plymouth was right behind with 54%.

Ford cut back 18%. Mercury took a whopper of a slash with 89%, and Lincoln 65%. Since then, Mercury has gone back to normal production, and Lincoln is still bettering its 1955 pace.

Chevvy kept pace with Ford by cutting back 17%. The rest of the General Motors divisions averaged out at 20%.

Bad news for the wheel people?

If its as good as it's supposed to be, the new Goodyear tire-within-a-tire could mean a 20% cutback in manufacture of automobile wheels in the next couple of years.

Why? It eliminates the need for spares. With a tire inside a tire, each having its own air supply, you can drive as much as 250 miles with a slashed outer casing.

Goodyear officials feel that when the rest of the rubber industry swings in behind them, there'll be no spare tires in the trunks at all—at least on new cars, although the $60-or-so price tag per tire is going to keep a lot of people riding on conventional tires for some time.

It'll be a boon to the auto stylists, who for years have been trying to get rid of the spare so they can do a decent design job on trunks. The Goodyear tire, developed primarily to remove the hazard of changing tires on heavily traveled expressways and freeways, is expected to become industry wide as soon as other tire companies can install new tooling and facilities.

Toolingwise, the new tire calls for all-new molds for the inner part of the tire. That means anywhere from $500,000 to $1 million expenditure per manufacturer. And costs can soar to several times that amount when production line tooling is added.

Evidently it's worth the trouble. Final proof of performance was provided at a press preview in Akron, where a car with four badly slashed tires roared up and down an airport runway for three hours—riding safely on the inner tire.

In short, if you get a blowout with the new tire while you're on a heavily traveled artery, you just drive to the nearest turnoff and garage—no matter if it's 20 or 250 miles.

And if you make auto wheels, you're going to lose the manufacture of the spare wheel.

Revolution in body suspension . . .

Another segment of the auto parts producing industry faces a threat, too, within two years.

Truck, auto and tire people are bending every effort to perfect an air suspension system that will completely eliminate all present methods of auto and truck body suspension. It would replace the current leaf, coil and torsion bar systems on cars and trucks.

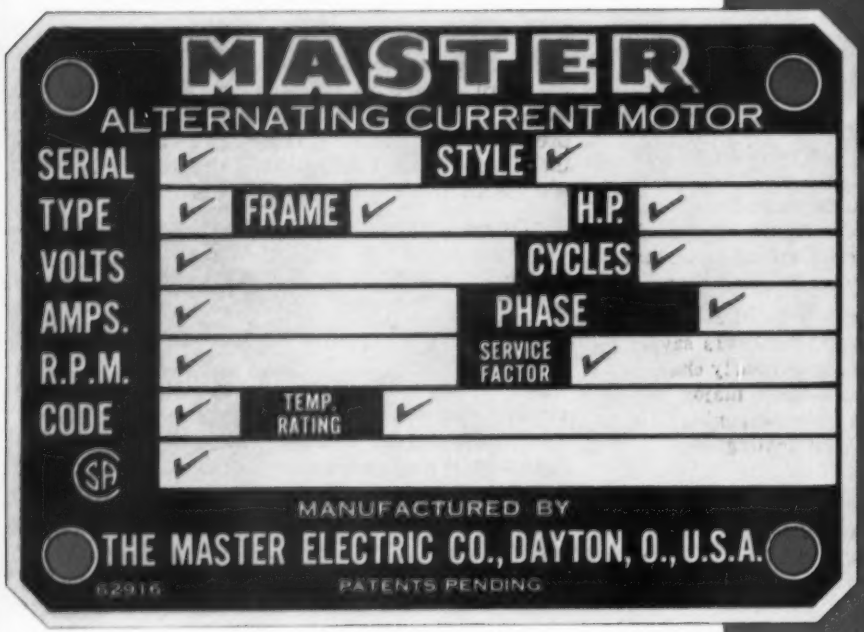
That doesn't mean Metalworking will lose out completely—the air beams, or chambers, that provide balance of air in the system must be made of metal, and new tooling contracts for them will be underway within a year.

Leveling valves, another important component, will call for considerable tooling, too. So will the air compressors.

How serious are the auto people about getting away from current suspension systems? Word is out in Detroit that Cadillac's El Dorado brougham (slated to come out this fall after many production delays) will have a custom-built version of the General Motors truck and coach air suspension.

Biggest problem facing development crews on the new suspension system is adapting it to the limited space available in the car's underbody area.

Write your own ticket—



What are your power drive requirements? Here at Master, with the widest selection in the nation to choose from, you're sure to fill your needs quickest and best.

Need something special in gear reduction—electric brakes—variable speed operation—fluid drive or special mounting? Or would some of our standard models (⅛ to 400 H.P.) fill the bill? You'll find the answer here! And remember, all Master components are engineered to form combinations of units in one streamlined, compact package of efficiency. Name your need and the name that fills it is Master—for greater salability of motor driven products; for increased productivity of plant equipment.

Motor Ratings ⅛ to 400 H.P. All phases, voltages and frequencies.

Motor Types Squirrel cage, slip ring, synchronous, repulsion-start induction, capacitor, direct current.

Construction Open, enclosed, splash-proof, fan-cooled, explosion-proof, special purpose.

Speeds Single speed, multi-speed, and variable speed.

Installation Horizontal or vertical, with or without flanges and other features.

Power Drive Features Electric brakes (2 types)— 5 types of gear reduction up to 432 to 1 ratio. Mechanically and electronically-controlled variable speed units—fluid drives—every type of mounting.

THE MASTER ELECTRIC COMPANY
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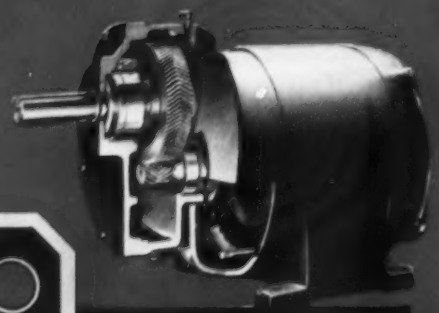
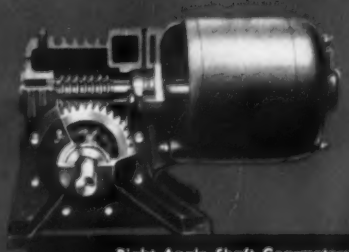
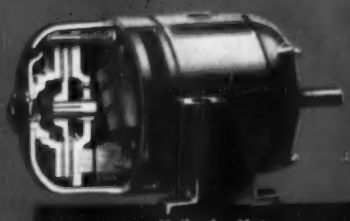


Parallel Shaft Gearmotors

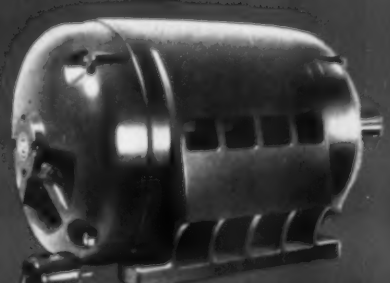


Right-Angle Shaft Gearmotors



Unibrake Motors

Speedrangers



Standard Motors— ⅛ to 400 H.P.

Machine tools ... NEWS REPORT

BDSA talks with industry . . .

Machine tool people had their innings with the government June 6—so did the makers of metal cutting tools, tool and die manufacturers, fixture makers and precision measuring tool makers—in an all-day session with officials of the Dept of Commerce's Business and Defense Services Administration in Washington. The 70 industry people attending were members of the Joint Industry Advisory Committees.

Accelerated tax amortization would stimulate expansion of production equipment capacity, Commerce Secretary Weeks told the group. Right now, the official expansion goal under which the five-year writeoffs are granted is closed, but presumably Weeks has recommended that ODM reopen the goal.

Secretary Weeks also favors leasing government-owned equipment to production equipment makers as a means of keeping the industry in a "sound and vigorous condition."

No. 1 item on the Conference agenda was the Defense Dept's new Tool Modernization Program. Representatives from Defense and the three Services outlined plans to replace obsolescent military-owned production equipment.

But industry made no bones about its disappointment over the slowness of the program, and over the Pentagon's failure to provide details on how tool procurement will be handled.

Some new information did come up at the meeting, however: the Army in the next 3 to 5 years will spend $78.5 million on production equipment—$70 million of this for new tools, $7 million for rehabilitation, and $1.5 million for gages and inspection equipment. However, the proposed programs will entail "annual expenditures of these sums," which must be okayed by Congress. Assistant Air Force Secretary Dudley C Sharpe indicated that it will take at least two months before financial details are available on the Air Force program, which calls for stripping inventory of obsolete and worn-out tools, replacement in inventory of tools for which more advanced types exist, and repair of older tools if economically feasible.

Air Force will dispose of pre-1941 tools in need of repair, those bought in 1941-1946 and requiring 25% or more of acquisition value for full repair, ones bought after 1946 needing 35% or more of value for repair.

Against these criteria, the Air Force has set an overall repair ceiling of $3500 per machine.

In the next year, Air Force disposal operations will cut its inventory by about 4500 tools out of a total inventory of 145,000 tools.

Speaking for the Navy, Rear Admiral Albert G Mumma, Chief of the Bureau of Ships, said "the Navy acquires during slack business time in the tool industry a limited quantity of key items that will be required during mobilization."

Military spokesmen agreed that new weapons and new materials call for new types of machine tools and other production equipment.

Said Air Force's Sharpe, "The Air Force is vigorously supporting the development of more advanced type tools and equipment . . . In many instances, an adequate commercial incentive does not exist to warrant the investment of high-cost development efforts.

"The urgency and need for better production tools justifies our financial support of development of this type."

Mr Sharpe cited as types of equipment involved: heavy presses, profile milling machines, and stretch presses.

Navy launches replacement program . . .

The Navy has taken bids on the first big order to be placed under its new Machine Tool Replacement Program. About $3.5 million worth of machine tools are to be bought.

Included on the order: 10 engraving machines, 29 upright drills, 276 lathes with 10- to 16-in. swings, 15 contour sawing and filing machines, and 4 honing machines.

The Navy says awards will be based on low bids and adherence to specifications. The order does not include a set-aside for small firms, nor is there a ban on foreign bids. Bids have been solicited through the Navy's machine tool industry mailing list.

But it's not so certain that firm orders will be placed right away. There's one little hitch—money. Apparently, the Bureau of Ships asked for bids before firming up allocation of funds from the Navy budget to pay for the tools.

Senate attacks tool policy . . .

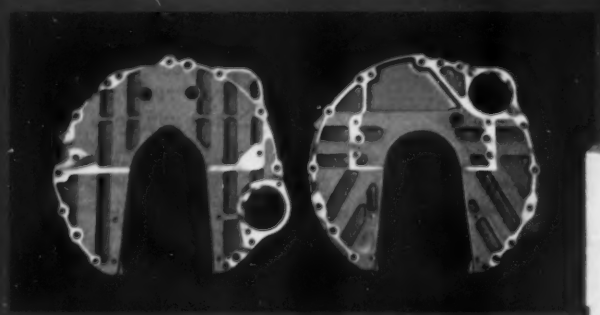
Senate Small Business Committee has waded into both the Defense Dept and ODM for failing to carry out the Vance Plan for machine tool stockpiling, and for dragging their feet on a government tool replacement program. (Detailed story on pp158-159.)

Buhr ECONOMATIC

performs 155 operations on two types of torque-converter adapter plates!

Production . . . 200 pieces per hour at 100% efficiency

Operations . . .
37 drilling, 12 reaming,
1 boring, 37 countersinking,
36 inspection
and 29 tapping



- Two types of plates may be loaded at random. Machine automatically selects and performs required operations
- Sectionalized bases to facilitate future part changes
- Automatic lubrication of all moving parts
- Mist-lubrication to all spindles to maintain uniform temperature in heads
- All spindles arranged for pre-setting of cutting tools to minimize downtime for tool changes
- Hardened-and-ground steel ways
- All standard and special parts interchangeable for ease of maintenance
- Machine conforms to J.I.C. Standards

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HIGH PRODUCTION MACHINERY

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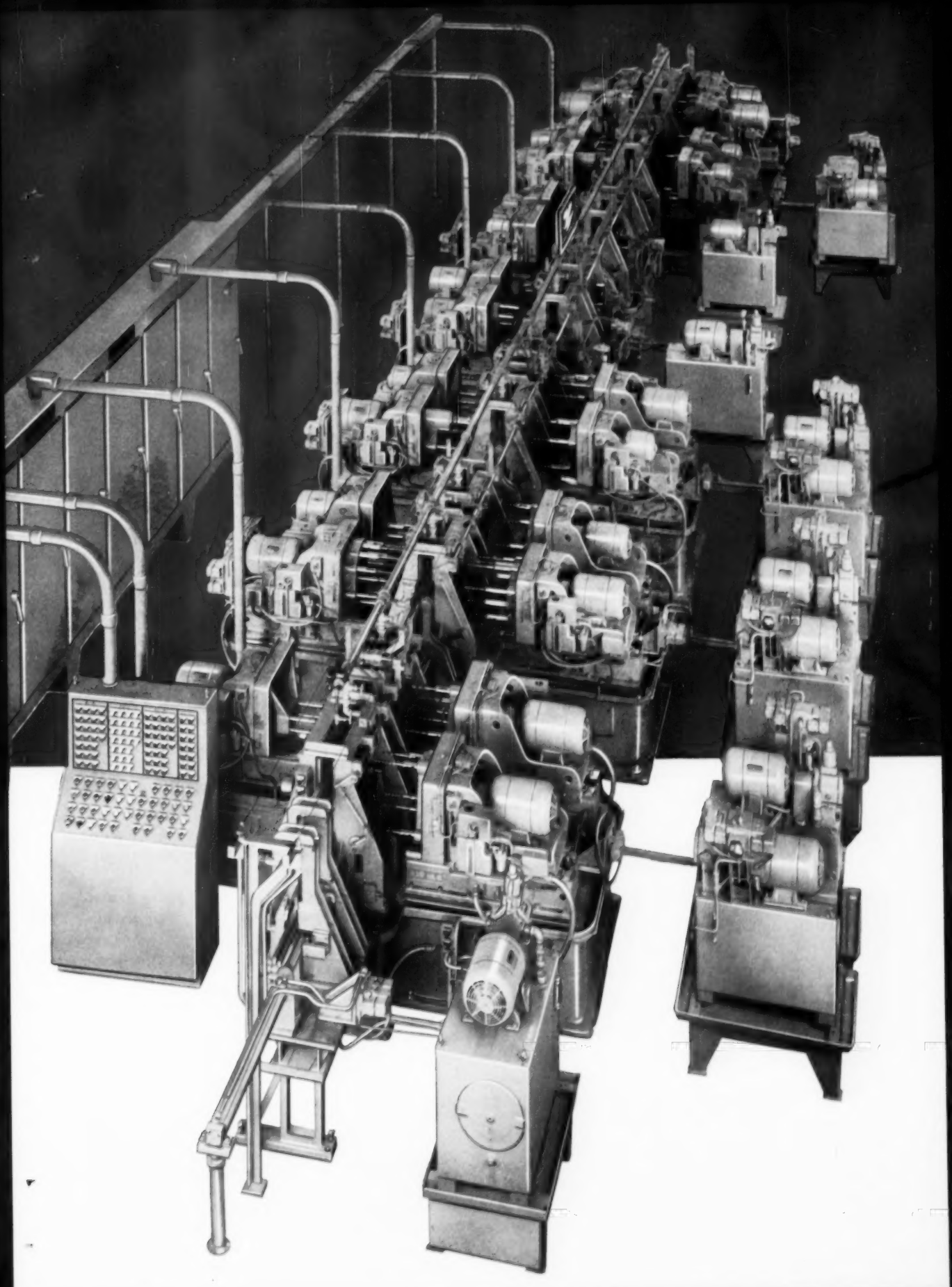
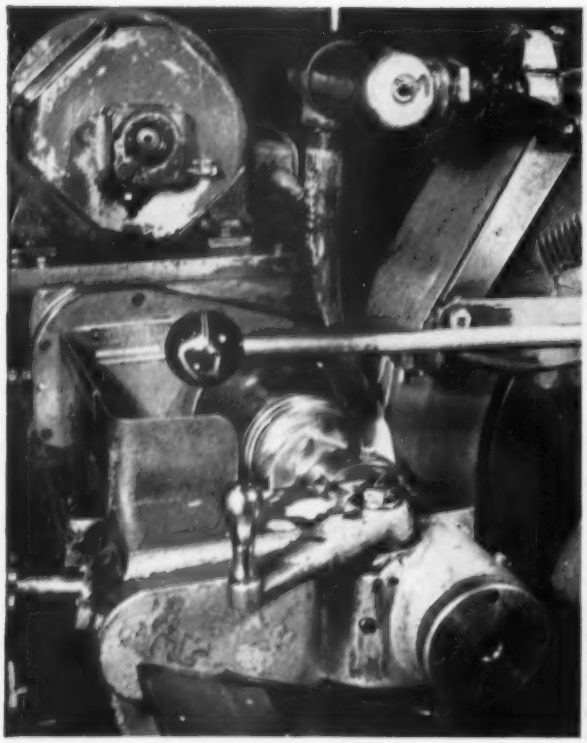
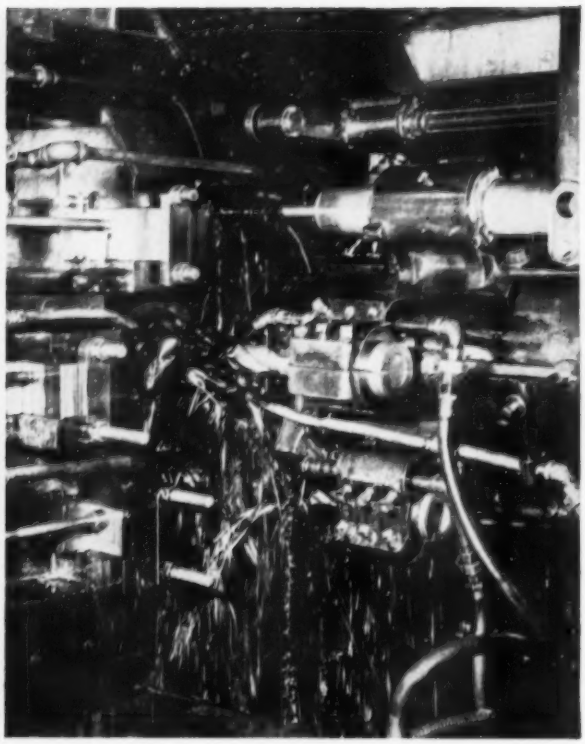




Grinding with Texaco Soluble Oil HW



Automatic machining with Texaco Sultex Cutting Oil

"We found out fast that Texaco does an excellent job"

Jack & Heintz, Inc., Cleveland, Ohio

"About a year ago," reports Jack & Heintz, Inc., "we tested competitive cutting fluids against the Texaco products we had been using for a number of years. We found out fast that Texaco does an excellent job.

"To cite just two examples: On our grinding operations, where precision is essential and low micro finishes necessary, we found that *Texaco Soluble Oil HW* (especially designed for hard water) gave us good rust protection and a fine finish at lean emulsion ratios. In addition, it did not load wheels and we had no odor complaints.

"In our automatic department, where we have all types of single- and multi-spindle machines and work all types of material including high alloy and stainless steels, *Texaco Sultex Cutting Oil B* gave us the good finish, long tool life and uninterrupted performance we wanted."

There is a complete line of *Texaco Cutting, Grinding and Soluble Oils* to help you do all your machining better, faster and at lower cost. Texaco Lubrication Engineering Service will gladly help you select the proper ones. Just call the nearest of the more than 2,000 Texaco Distributing Plants in the 48 States, or write:

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What's ahead ... in Metalworking

NEWS REPORT

Capital goods will carry the ball ...

Continuing boom in capital goods is proof that Metalworking's confidence in an expanding market isn't being shaken by the drastic slump in automotive output, and by softness in appliance and farm machinery sales.

Machine tool new orders continue at unprecedented levels—in the neighborhood of three times as much volume as in the years 1945 to 1947, and shipments are up, too.

Industrial equipment and supplies sales are running at a peacetime-high rate, with current order volume more than double that of the base month of July 1948 on the American Supply & Machinery Manufacturers' Association Index.

Resistance welding equipment sales have nearly doubled this year over 1955, and industrial heating equipment orders are hitting new highs.

Thus Metalworking's supplier industries, bellwethers of future good business, are maintaining high levels of activity in spite of an outright slump in the automobile and auto parts industries, continued low farm equipment sales, and a softening in appliances.

Turnabout in appliances ...

Literally out of a clear blue sky of soaring sales and output, the appliance industry has plunged into a melee of price-slashing to get rid of tremendous overstocks. It started just a few weeks back, when retail sales dropped sharply.

The industry's output is still geared to boom levels and appliance stocks are piling up in much the same way they have in the auto industry, and the appliance people are taking the same way out—production cutbacks and layoffs.

But the industry is confident the softening won't last. In fact, a few of the appliance makers are still running ahead of year-ago sales.

Auto drop makes itself felt ...

Auto parts makers are in a lull, which they hope will break at summer's end. Some production orders are starting to show from Detroit, but scheduled deliveries are set for after August 1. Meanwhile, cutbacks and layoffs continue in the parts makers plants, but to a lessening degree.

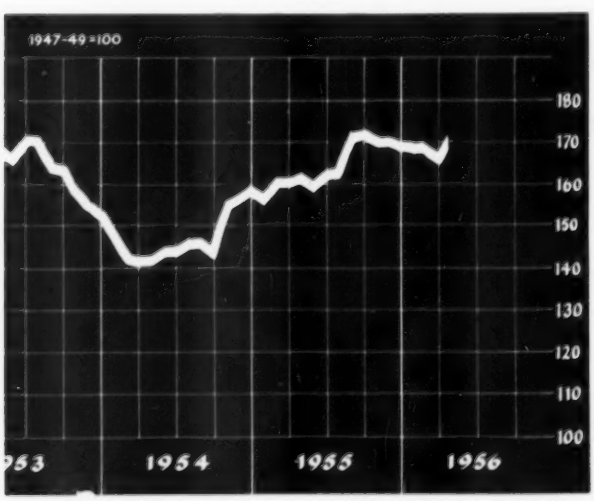
The foundry industry is feeling the pinch, too. Automotive orders for malleable castings have dropped off 20-25%.

Steel warehousers are optimistic ...

Across the country, warehouse sales of steel are running well ahead of 1955. Even in Detroit, where everything has supposedly gone to pot, sales for the first five months of this year are better than 30% ahead of the same period last year.

The warehousers aren't worried about a steel strike. Most of them have a comfortable six months' inventory of cold-finished bars and galvanized sheet. And they average a 3 months' supply of alloy steels, 4 months' supply of flat-rolled sheets.

Weakest inventories are in plate and heavy sheet stock, and in structurals.



AMERICAN MACHINIST INDEX OF METALWORKING PRODUCTION

BASED ON MANHOURS WORKED IN THE FIVE COMPONENTS

	MAY Estimated	APR Preliminary	MAR Revised	APR Year Ago
Total Index	**171**	**170**	**167**	**160**
Machinery	150	146	130	
Electrical Machinery	204	191	185	
Autos	131	134	156	
Other Transportation	310	310	272	
Other Metalworking	139	137	132	

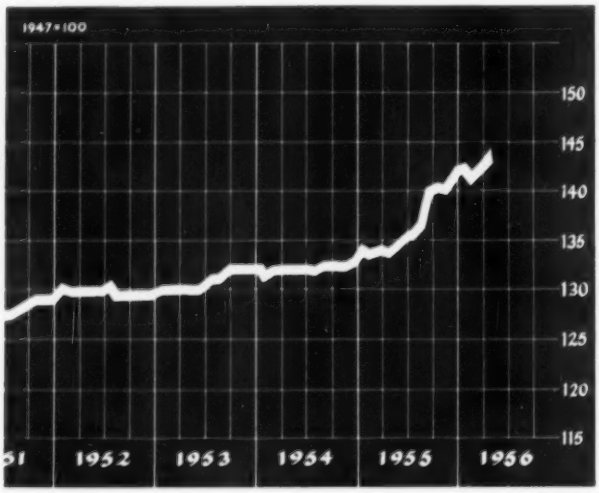
NEWS REPORT

What's ahead . . . in Business

AMERICAN MACHINIST INDEX OF METALWORKING PRICES

	MAY Estimated	APR Preliminary	MAR Revised	APR Year Ago
Total Index	**143.6**	**143.3**	**142.1**	**134.5**
Metalworking Machinery	164.0	162.2	146.4	
Other Machinery exc. Electrical	149.3	148.7	139.2	
Electrical Machinery	140.8	139.1	131.6	
Fabricated Metal Products	137.8	136.4	130.8	

143.6



What's going to happen to prices–and profits?

Two facts can shape a firm's profit picture for the coming year: (1) how much will you have to pay for equipment and materials to make your products? And (2) how much can you get for your finished product?

Armed with these two facts, any businessman will have a pretty good idea of how his company's books will look by mid-1957.

Trouble is, the economic crystal ball today can't present a clear-cut picture of prices and profits over the coming year for any given industry. It can't predict, for instance, that farm machinery prices will rise 15%.

But some significant trends have shown up recently on the Bureau of Labor Statistics Index of Wholesale Prices. For example, in May 1956 the Index registered a 4.5% gain over May '55.

A jump this big has happened only 10 times in the last 30 years.

Industrial prices have gone even higher since spring of 1955—May 1956 prices averaged 9% higher than in May 1955. Rising industrial prices will continue throughout the year—but the percentage of increase will be less.

Prices of farm products are going up, too, although they're still 5% under the high point reached in April 1955.

Such a combination of moderate price increases for industrial goods and relatively bigger prices for farm products could result in another overall price increase of 4.5% in 1956. That's what could and should happen, but don't bank on it. Several factors could upset the applecart:

It's clear we're in for another round of wage increases. The economy isn't registering the gains it did last year. Industrial capacity has increased. Add all those factors up, and you find a lot of the pressure for price increases is off.

WEEKLY BUSINESS INDICATORS

	Latest Week	Preceding Week	Year Ago
Business Week Index of Activity (1947-1949 = 100)*	146.0	146.9	142.8
Steel ingot operations (thousands of tons)	2,373	2,370	2,286
Electric power output (million Kilowatt hours)	10,598	10,927	9,537
Production of automobiles and trucks	107,334	138,712	163,731
Engineering construction awards (Eng. News-Record—millions)	$250.2	$562.6	$378.3

QUARTERLY BUSINESS INDICATORS

	Latest Quarter	Preceding Quarter	Year Ago
Gross National Product (billions)	$ 398.6	$ 397.3	$ 375.3
Expenditures of new plant and equipment (millions)	$ 35.3	$ 33.2	$ 27.2
Profits after taxes in primary iron and steel industry (millions)	$ 386	$ 312	$ 230
Profits after taxes electrical machinery industry (millions)	$ 190	$ 172	$ 203
Profits after taxes machinery (except electrical) (millions)	$ 305	$ 269	$ 175
Profits after taxes in motor vehicles and parts industry (millions)	$ 495	$ 359	$ 275
Motors and generators new orders index (1947-1949 = 100)	201.6	207.7	156.7

* Seasonally adjusted.

CUT REPLACEMENT COST More than Half

with NEW T-J REAMERS

REPLACE ONLY THE PART THAT WEARS OUT!

1. **Cuts replacement cost to less than half!**
2. **Quick change of heads saves time.**
3. **Easy to change heads for different metals, increases efficiency.**
4. **Head and arbor firmly locked together.**
5. **Wide range of sizes.**

Exclusive in design . . . the New-type T-J Reamers cut your replacement costs to *less than half!* Only the quickly installed *head* to replace, after buying original shank. Wide range of interchangeable heads from ½" to 2¾" inclusive, in 1/16" increments are available with right or left hand spiral flutes for thru or blind hole reaming.

Tapered hole in head insures concentricity and *new* thread design assures a snug fit on smoothly ground tapered shank. Reamer operates free from binding or sticking due to cutting portion wearing undersize and creating negative relief. Backed by T-J's 39 years of know-how as one of the largest manufacturers of die sinking milling cutters.

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EVERY INCH TESTED

Armco Stainless Steel bars inspected on these units get a thorough "going over." Every square inch of these bars is tested. Whenever a defect is found the oscilloscope "blips" and a speaker squawks. Defective bars don't go into your order.

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American Machinist

MAGAZINE OF METALWORKING PRODUCTION • ESTABLISHED 1877

Time to start

Just what is the effect upon workers of "accelerated technological change" popularly known as automation? Is the effect good or bad? If it is bad, what should be done to avoid it?

This appears to be a fascinating topic for discussion in as learned groups as the Society for Applied Anthropology and in as down-to-earth organizations as labor unions.

But to no group is it more important than to manufacturers who apply automation in their own plants. They cannot be callous or indifferent to it. They are aware of the devastating results of a do-nothing attitude on their part, an attitude that might bring on undesirable governmental action.

Many manufacturers have programs . . .

of their own to cope with conditions arising from automation. Take General Electric. President Ralph Cordiner testified recently that his company tries to plan any substantial technological change in such a way that the normal attrition of the work force—people who quit, retire or die—absorbs the shift in employment. For it is no secret that mechanization means the displacement of workers at the machines or in the department or even in the plant to which it is applied.

General Electric also does a good deal of informal training on the job and conducts so-called "vestibule" training schools that run from one to two weeks to prepare men for specific kinds of work.

The mechanical division of General Mills, inspired by the need for solving its own automation problems, has evolved a training plan in connection with the redistribution of employees within its own plants.

It has set up a retraining plan in cooperation with the Minneapolis Vocational High School, has a paid apprenticeship program and a financial assistance scheme for schooling for its men. It also provides specialized courses to train workers in making a new product and to bring them up to a new level of proficiency, as in the case of assemblers for high-precision electromechanical instruments.

A number of companies are doing . . .

on either a large or small scale what General Electric and General Mills are doing. In the midst of these commendable individualized efforts, however, let's not lose sight of the enormous scope of the problem of dealing successfully with the human side of automation. The problem should be faced before it is upon us.

We think that Dr. Cledo Brunetti, director of engineering research and development of General Mills, has the right approach. He urges that industry begin immediately training activity within its labor force to meet automation head on. Short-term dislocations of workers are inevitable as mechanization of production processes increases. But such dislocations can be minimized by advanced retraining.

A broad educational campaign . . .

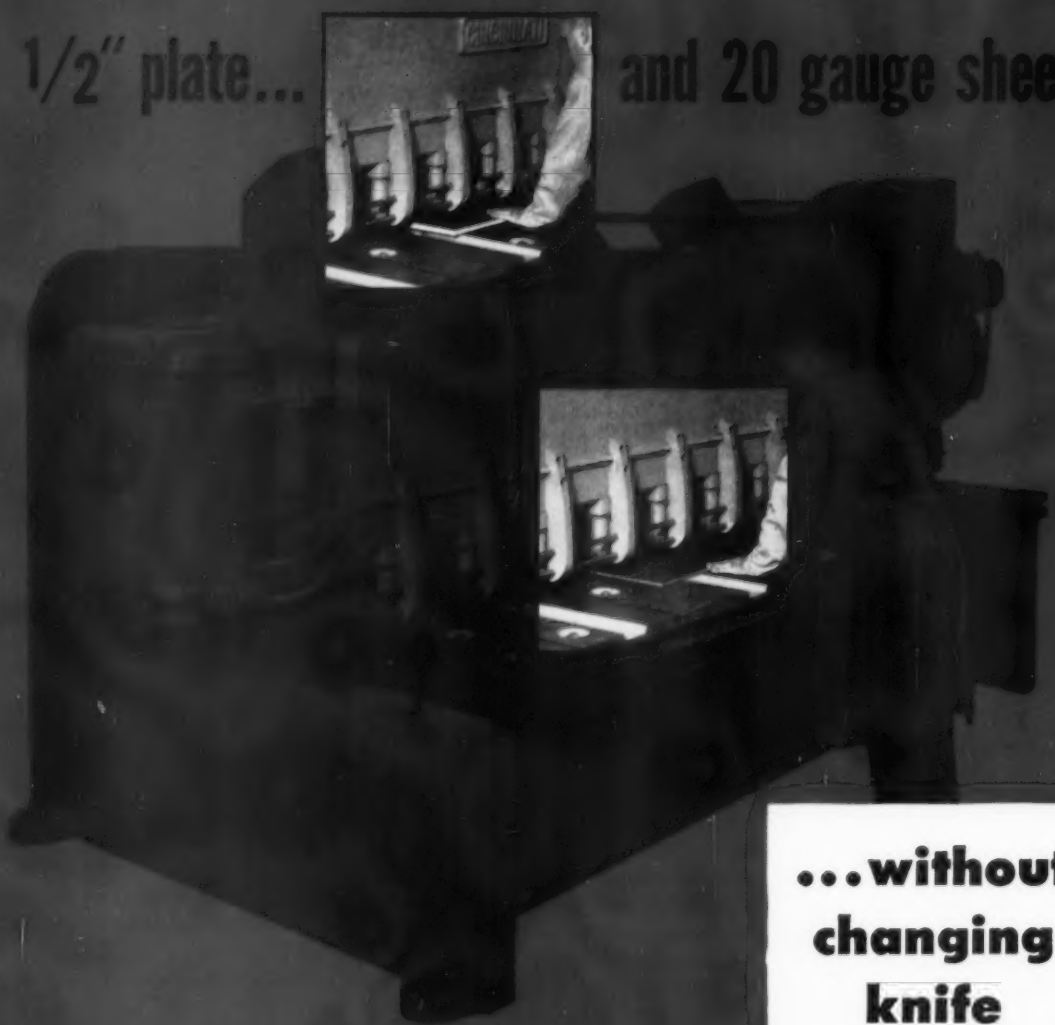
to alert individual manufacturers to the benefits to be derived from such training should be undertaken without delay by industry leaders. This educational work might be on a community-wide or an industry-wide basis.

No matter how it is done, the thing to do is to get going. Better that manufacturers act promptly and on their own initiative to solve the human problems of automation than to wait and let either the government or the unions do it for them.

Burnham Finney EDITOR

CINCINNATI accurately shears

1/2" plate... and 20 gauge sheets



...without changing knife clearance

... You do not change knife clearance for successful shearing of different thicknesses on a Cincinnati. Just set the clearance for the thinnest material and shear all thicknesses up to capacity. Thousands of Cincinnati Shears are used continuously in this manner. This practical method prevents accidental damage—saves time. Remember, changing knife clearance interrupts production.

Sharp knives are a necessity for satisfactory shearing, especially on very light gauges. Remember, changing knife clearance does not sharpen dull knives. We suggest you write for data sheet on knife life.

Write for Catalog S-7 ... describing Cincinnati Shears

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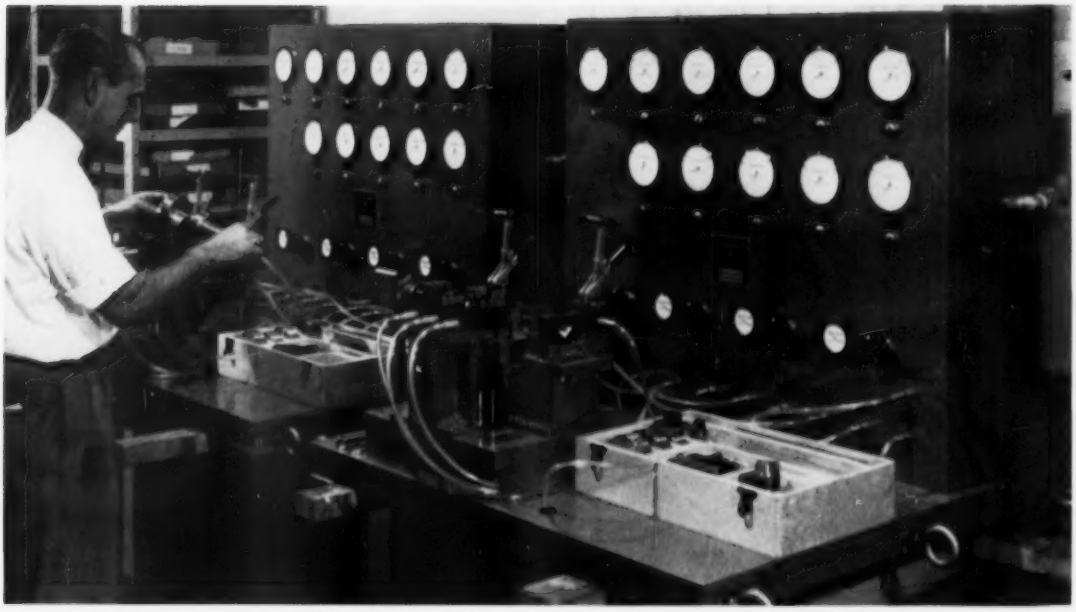


REFRIGERATOR-COMPRESSOR CRANKSHAFT—Multi-dimension air gages check 11 dimensions. On one of the two identical gages, the operator is shown placing a crankshaft in the loading V. He then pulls a lever to drop the loading V and push a gaging V into position. Six air-snap units are brought into position to measure diameters of bearing journals and cams.

A positioning device next moves the crankshaft to the right, to measure the throws with AirProbes, which are universal air-gaging spindles that make direct mechanical contact. Another AirProbe, on a free-floating transfer device, checks squareness of the thrust face with the bearing journals. A portable air snap measures the end diameter of the shaft

How to select air gages

How the part is gaged is just as important to production flow as the choice of machines and tooling. Analyze your jobs for gaging requirements, then work with the gage designer to get the most suitable type of gage. If an air gage is indicated, this article will help you to understand the advantages and limitations of the device

ROBERT J. THOMAS, JR.
manager, Air Gage Engineering
FEDERAL PRODUCTS CORPORATION
PROVIDENCE, R. I.

When the tool engineer analyzes the production processing of a part, he must constantly ask himself—

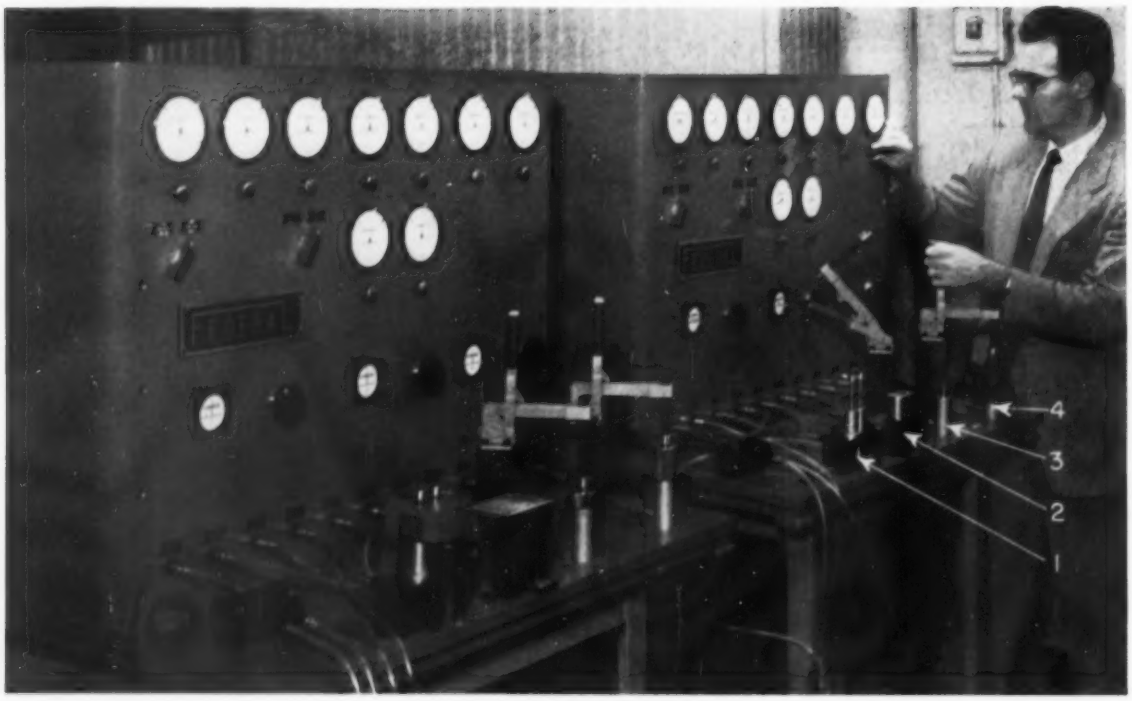
"How shall we gage it?"

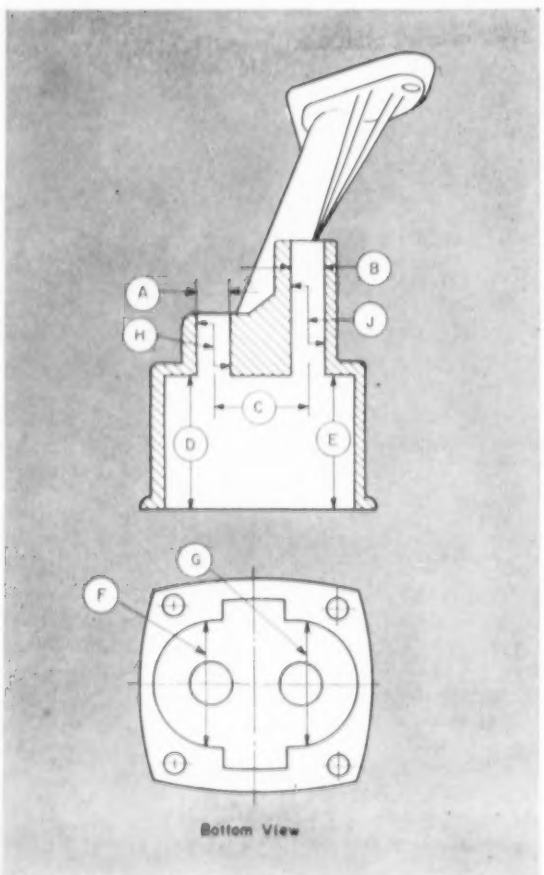
For under today's conditions of manufacturing to quality-control standards, the choice of gaging methods can't be an after-thought.

In fact, when he starts a processing analysis, the tool engineer should consider how to set up the parts for gaging, and what dimensions should be held with reference to others. (Of course, the product designer has already set tolerances on part dimensions). But it is up to the tool engineer to work from the basis of *why* a part is gaged. And likewise, it's his job to compile the information needed by the gage designer, so that the latter can supply the kind of gaging device best suited to the purpose. See Check Chart, p115.

The quick answer to why a part is gaged is: to make sure that it reaches the required dimensional quality level, that it will "fit" when assembled or used. But adequate gaging does more. It holds

How to select air gages . . .





Bottom View

OIL-PUMP HOUSING—Two identical four-station air gages check nine dimensions.

At the first station, the operator places the housing over two vertical air plugs. The first three meters indicate ID's of the two holes as well as their center-to-center distance. The ID's can be measured separately by two separate plugs to the left of the first station. With these plugs, the operator can also check hole taper, out-of-roundness, bellmouth, hourglass, and similar conditions throughout the length of the holes.

Station 2 with its two large air gaging plugs checks depths as well as ID's of two large holes in the body of the housing. At stations 3 and 4 squareness of the two holes first measured at station 1 is gaged by clamping the housing, then slowly rotating it while watching the proper meter hand. The squareness error of the workpiece is the full sweep of the meter hand as it is rotated.

Flexibility of this gage was increased by mounting the four stations on precision blocks. If the size of one of the holes in the pump housing is changed, a replacement gage plug to measure the new size can be made.

Station I:
A—ID of 0.4775—0.4785-in. hole
B—ID of 0.4838—0.4848-in. hole
C—Center distance of two holes

Station II:
D—Depth 1.504 in.
E—Depth 1.504 in.
F—ID of 1.534-in. hole
G—ID of 1.534-in. hole

Station III:
H—Squareness of 0.4775-in. hole to shoulder on 0.680-in. radius

Station IV:
J—Squarenes of 0.483-in. hole to shoulder on 0.680-in. radius

down scrap or rework, avoids serious production delays, assures fast and better assembly, and guarantees better service and customer satisfaction. For purchased parts, good gaging practice smooths relations between vendor and user company.

In the modern shop, the trend is strongly toward the use of gaging equipment that is as fast and versatile as production methods. Such equipment must be constantly definite and dependable, if it is to confine the finished workpiece dimensions within the specified limits.

Some engineers and production men still regard the go and not-go gage as the basis of their gaging systems. But most people realize that, while there will always be a need for some go and not-go gages because of certain limiting reasons, the indicating gages offer greater advantages in most cases.

With an indicating gage, part production can be controlled by measuring variables within the tolerance limits, as required, for example, by a statistical-quality-control program. The indicating gage supplies far more information on the dimensional characteristics of a part than can a fixed-limit gaging system. And, at the same time, natural variations in human perception are eliminated. The sense of touch or "feel" varies from one person to another, but ability to read an indicating gage can be considered practically constant from one person to the next.

GAGING-SYSTEM SELECTION

Selection of the indicating-type gage system depends on gaging requirements and conditions. These may vary greatly from the very simple to the very complicated. Along with accuracy, cost, versatility, and maintenance factors, they determine whether an air, dial-indicator, electric or electronic gage will do the best job.

The gage designer, for example, must be told how and where the gaging will be done—on bench or machine, whether the gage must be portable, how many pieces per hour will be gaged, and workpiece condition, material, tolerances, suitable reference points, and

CHECK CHART FOR INFORMATION NEEDED BY GAGE DESIGNER

1. Whether the inspection is a production or final-inspection operation.

2. Availability of a workpiece sample.

3. Scale indications desired.

4. Preference for type of gage, if any.

5. Parts per hour to be gaged.

6. Point of gaging—on bench or machine.

7. Whether gage must be portable.

8. Whether master is required. (Or will a chromium-plated workpiece serve as the master?)

9. Dimensions and tolerances to be checked.

10. Surfaces that can be used for locating.

11. Assembly drawing so the designer can see how the part to be gaged functions in the final assembly.

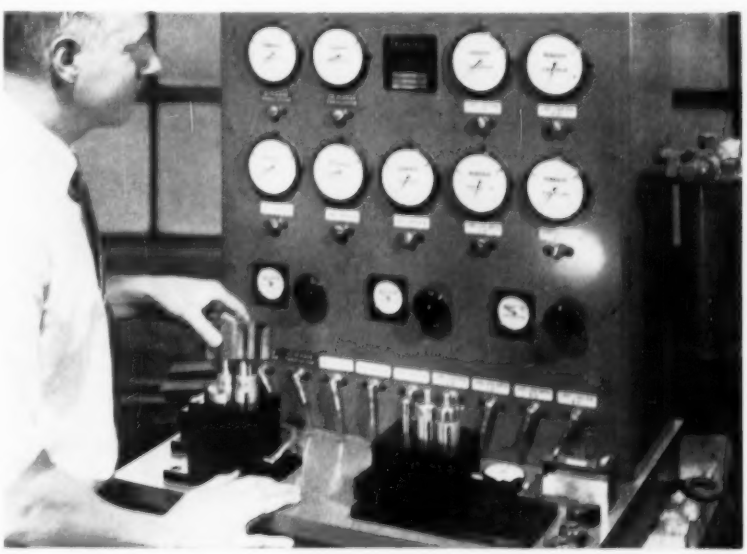
12. How part will be held during gaging, whether in machine, on conveyor belt, or on bench.

13. Any deviations of part from blueprint and any special conditions, such as burrs, pits, salvage tolerances, surfaces unfinished at time of gaging.

14. Relationships (concentricity, squareness, parallelism, etc.) to be checked that are not clearly shown otherwise.

15. Clearance problems that are not obvious from prints and sketches. Examples: knobs that might interfere with gage application, or tools that might not back far enough from the workpiece to give gage clearance.

16. Any special requirements—gage drawings, special paint jobs, markings desired.



OIL-PUMP-BODY—A multiple-station air gage measures nine dimensions in two gaging stations. Station 1, at the left, measures the workpiece for bi-planar and co-planar parallelism. Variation from the master setting is shown by the two meters at the upper left of the gage board. At Station 2, three multiple-dimension air plugs measure two depths and five inside diameters.

A dial indicator, at the right end of the second station, gages the center distance of the gear-pocket bores. Combining a dial indicator in this way into an air-gage setup can increase the gage's flexibility, cut its cost somewhat, and yet give readings of sufficient accuracy

whether dimensions to be gaged are easily accessible, plus many other related details. Therefore, selection of the best gage for the job requires consideration of the relative advantages of the various types of gages without resorting to habit or fads.

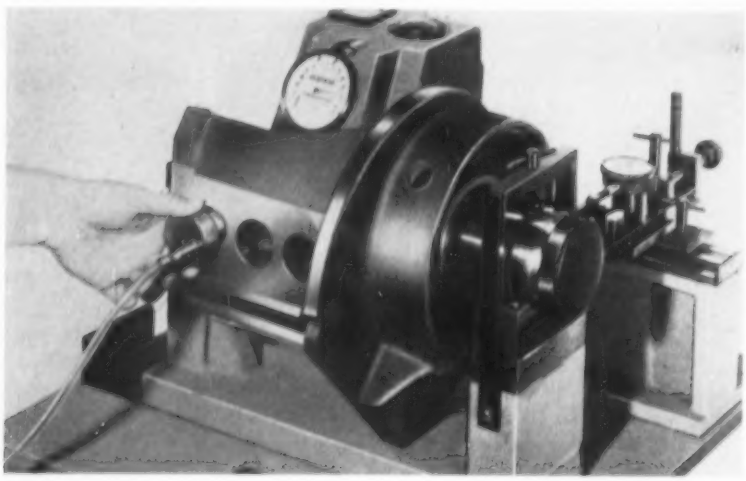
Air gages, as a rule, are more precise than dial-indicator gages, but are not always so accurate as electronic gages. They are generally selected for checking tolerances in the tenths of thousandths, although dial indicators can measure to tenths of thousandths and often as accurately or nearly so, and in most cases more economically.

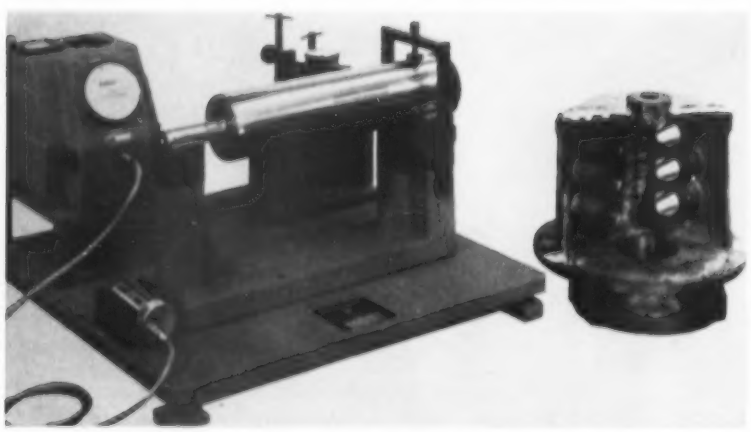
When both types of gages—air and dial indicator—can handle the job, the number of pieces to be gaged per hour may limit the selection to the air gage. In some cases, the operator can apply an air gage faster and in many applications, as in a bore, with less chance of misgaging. No special skill is needed to use an air gage, except in the case of air snap gages. An air plug locates itself quickly and readily in a hole. A dial-indicator gage, however, may be rocked slightly to center it and obtain the correct reading. This may lead to slower gaging and possibly to operator errors. Even so, the lower cost of the dial-indicator gage may make it the better gage to buy.

In some respects, air gages are more versatile than dial-indicator gages, but here again gaging requirements govern the selection. The gaging member of an air gage can be readily designed to measure small, deep, inaccessible holes or recesses. It can be connected to the indicating unit by a flexible tube and easily manipulated for application to the work.

Cost favors use of a dial-indicator gage whenever possible, unless fixture cost would prove excessive. On the other hand, air gaging may be faster and maintenance cost lower.

Before letting maintenance cost be the deciding factor in gage selection, the tool engineer should recognize that maintenance includes more than that of the indicating instrument itself. Dial indicators, being mechanical in nature, may need periodic rebuilding. Trouble-free operation of all air gages requires proper maintenance of air lines and compressor equipment to keep oil, water, and dirt from affecting the accuracy of gaging. Besides, air plugs, rings, and other air-gage components wear and may need refinishing by chromium plating and grinding.





COMPRESSOR-CYLINDER HOUSING—A combination air-dial indicator gage checks the squareness of six cylinder bores and the concentricity of the large counterbore with the mutual axis of the main bearings of the cylinder housing.

An AirProbe and a Dimensionair gage the squareness of the cylinder bores. The housing is supported by a dual-expanding mandrel inserted through the main bearings. A yoke clamp locks the mandrel in the larger V. The housing is rotated until the cylinder bores face forward so the squareness plug can be inserted.

In using the squareness plug, the operator must obtain two null-point, or equalization, readings by rotating the plug clockwise and observing when the air-gage hand reverses its direction. Minimum and maximum readings obtained 180° apart are balanced by adjusting the position of the AirProbe in the squareness plug.

The operator then checks concentricity of the counterbore by moving the dial-indicator unit into position axially. Rotating the workpiece gives concentricity readings on the dial

AIR-GAGING SYSTEMS

If a decision has been made to apply air gaging to a specific job, the tool engineer must select the type of air gage that best fits his needs. He has two basic systems to pick from: (1) differential-fixed and (2) variable.

The differential-fixed, or bal-

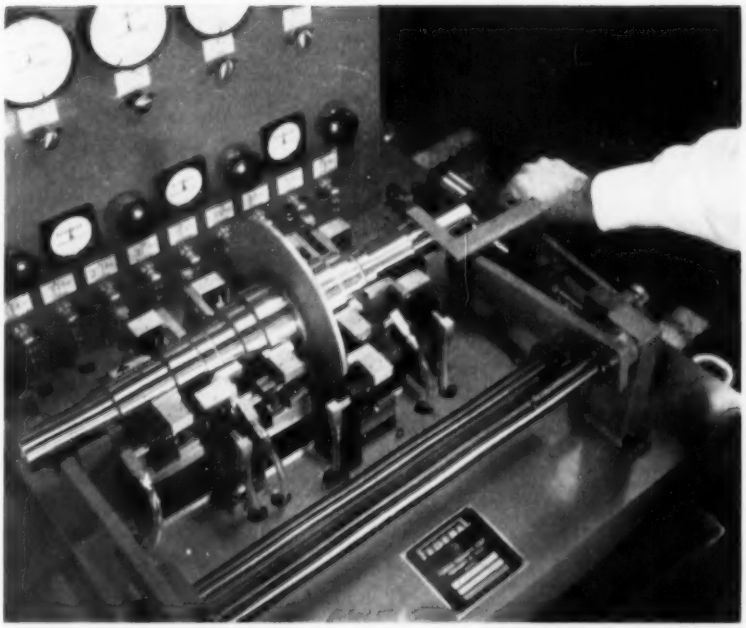
anced circuit, as employed in the Federal "Dimensionair," operates on a principle similar to that of the Wheatstone bridge. Filtered compressed air is pressure regulated and fed into two opposing channels. Here, the pressure is precisely equalized by non-adjustable jets. Air in one channel escapes through the gaging member. In the other, it escapes through a zero-setting valve.

Air escaping through the zero-setting valve is balanced with air escaping between the gaging member and the *one* master needed to set the gage. When the workpiece is gaged, any change in air pressure because of variation of workpiece size from the size of the master is translated by the indicating meter into precise linear measurements on its dial. Basic advantages of the differential-fixed system are its stability, calibrated accuracy and reproducibility.

Against these benefits, the tool engineer must balance the inherent limitation of any back-pressure system: the inability to use a long hose length with fast response of the indicating meter.

The variable-circuit gaging system has the zero adjustment directly in its gaging line. The metering device may vary in form and the indicating mechanism in location. In any case, the gage must be set by two masters—one for maximum part size and the other for minimum part size. As air escapes between gaging member and workpiece during gaging, restriction of air flow causes the indicating meter to register part size.

The principal advantage of the variable system is its adjustability to every plug, allowing the use of smaller plugs than with the differential-fixed system. The adjustability feature, however, may affect the reproducibility of readings.



TURBO PUMP SHAFT—A multiple dimension air gage checks eight diameters for concentricity with each other plus the squareness of four surfaces to these diameters. The part is lowered into gaging position on precision V-blocks by a loading cradle.

Gaging contacts are mounted on pantograph units for motion transfer to corresponding AirProbes. Eccentric and out-of-square conditions are indicated as the total variation on each meter as the part is rotated through 360°. To make gaging even easier, the gage can be motorized to rotate the workpiece.

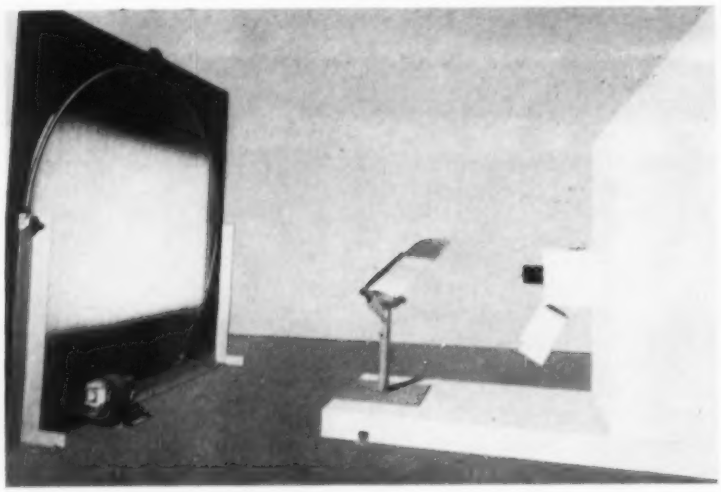
BASIC GAGE REQUIREMENTS

To make an intelligent selection, the tool engineer should consider what he may expect from an air gage. He may logically ask that the gage he selects meet these basic requirements:

1. Constant accuracy, reliable repeatability.
2. Stability.
3. Linear, direct-reading scale calibriated to graduations of definite, known value.
4. Fast reading.
5. Long measuring range to permit long approach range and increased clearance between workpiece and gaging member.
6. Long approach range — that part of the gage dial between either minimum part size for a hole or maximum part size for an outside surface and the end of the scale—so the operator sees how he is doing.
7. Maximum plug clearance to speed up plug insertion in the part being gaged.
8. Long gage-head wear and easy refinishing to bring gage head back to size.
9. Good jet protection.
10. Fast, easy setting of instrument and infrequent need for resetting to the master.
11. Little maintenance with minimum of down-time of gaging equipment.
12. Adaptability to special requirements and easy combination with electrical and electronic units for automatic gaging and machine control.

AIR-GAGING EXAMPLES

The air gage is highly versatile. It can be applied to simple and complex measurements. Among the simple applications are: hole measurements for diameters, out-of-roundness, bellmouth, taper, irregular surface, concentricity of holes, straightness, squareness, center-to-center distance, parallelism. Likewise, outside shapes can be gaged for diameter, out-of-roundness, height, width, depth of recesses, flatness, squareness of surfaces, and contour. Several examples show even greater versatility of the air gage to checking mass-produced parts. These installations were made after the tool engineer at the user plant and the gage designer had weighed all of the problems that had a bearing upon the inspection problem.



A ROTATABLE GRID (left), backed by fluorescent lights, and a lens (right) representing the viewing position of a user, are the elements of a transparency-inspecting machine. The transparency to be inspected is placed on the stand at center, in the same position with relation to the lens as it will be to the user's eye in service. The inspector is in a booth behnd the lens

Optical inspection machine measures transparency distortion

W A HEITZMAN
senior design engineer
CONVAIR (San Diego), DIVISION OF
GENERAL DYNAMICS CORPORATION

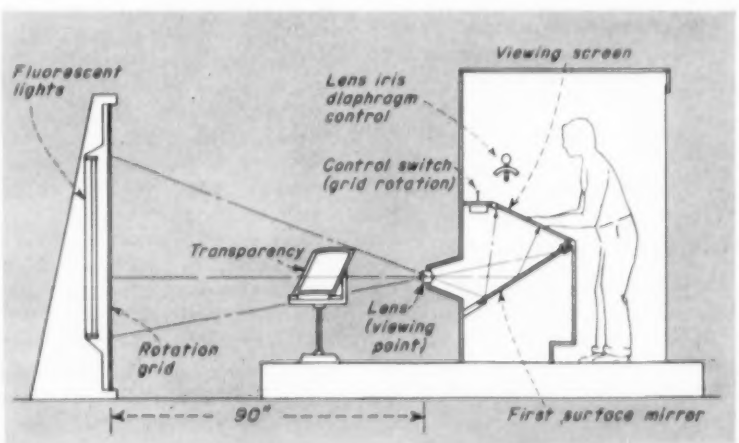
Growing demand for transparent plastics—whether for airplanes, houses, or automobiles—has made necessary a satisfactory optical inspection method that would insure maximum distortion-free vision. Convair has developed such a method for aircraft windshields which can be applied to any transparency. The principle is direct measurement of the distortion seen by the pilot.

When distortion is produced by a windshield, it is influenced by three basic conditions: position relative to the operator, distance between operator and windshield, and distance between windshield and objects viewed.

The first two distortion-influencing conditions can be exactly recreated by duplicating them in an inspection machine. The inspector's viewpoint through the windshield must be identical to that of the actual operator. The third condition can also be recreated, but this is a variable influence. When the distance between windshield and viewed object increases, distortion increases until the viewed-object distance is infinite and distortion is maximum.

Limits for tolerable distortion and the viewed-object distance can be established by the operator using the windshield in actual service. With this distortion limit and distance known, then it is possible to correlate these figures with the smaller windshield-object distance in the inspection machine.

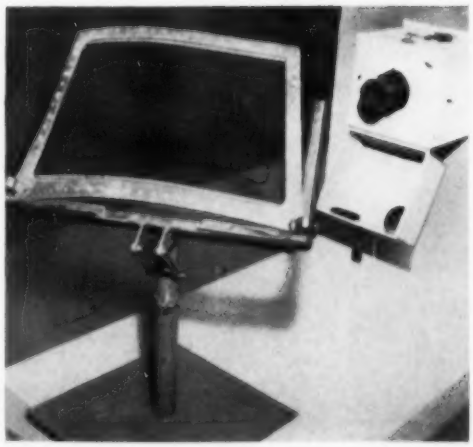
Distortion itself is caused by the two surfaces of a windshield which are not parallel and have an irregular variation of distances between the surfaces for a given linear space. These irregular variations can assume an unlimited variety of contours on the surfaces. In some windshields the distortion-producing contour may be such as



RELATIONSHIP of inspector to lens and transparency under test. Grid lines are ½ in. apart

not to render the distortion apparent with some attitudes of the object viewed.

The Convair optical-inspection machine uses a grid as the object to be viewed through the windshield. It is a true grid 80 in. in dia using only straight black parallel lines 0.032 wide, spaced 0.50 in. apart on frosted glass. Viewing is accomplished by placing a lens (f6.3, focal length 28.00) at a point that represents the operator's eye(s) relative to the windshield. The lens produces an image of the grid on a view screen, and this image is inspected for distortion. As mentioned before, the distortion may or may not be apparent at first, but if the grid is made to rotate during inspection, the distortion will show the lines of the grid bending a maximum amount at one place within 180° of rotation. When maximum line bending is found, grid rotaton is stopped and the angle of the bend is measured. A small transparent sheet of plastic with the limit angles scribed on its surface is used as a gage to compare with the bent lines.



WINDSHIELD-SUPPORT bracket incorporates elements for adjusting height, angle and tilt. The lens can be protected by a cover when not in use

Attachment hobs elliptical gears

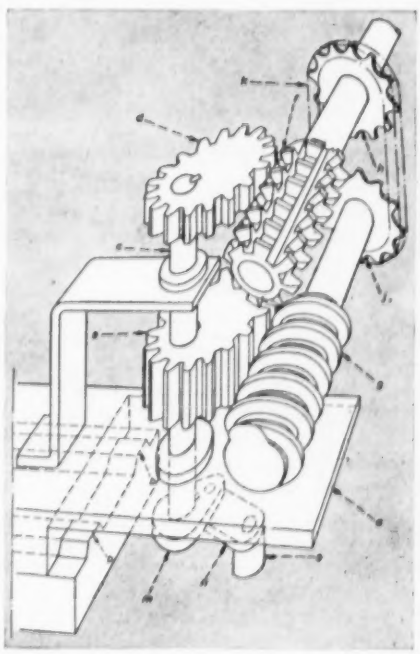
Elliptical gears are not in great demand but, when they are required, their production offers an awkward problem. Of particular interest, therefore, is the method developed at the ASEA works, Ludvika, Sweden, and shown in the illustration.

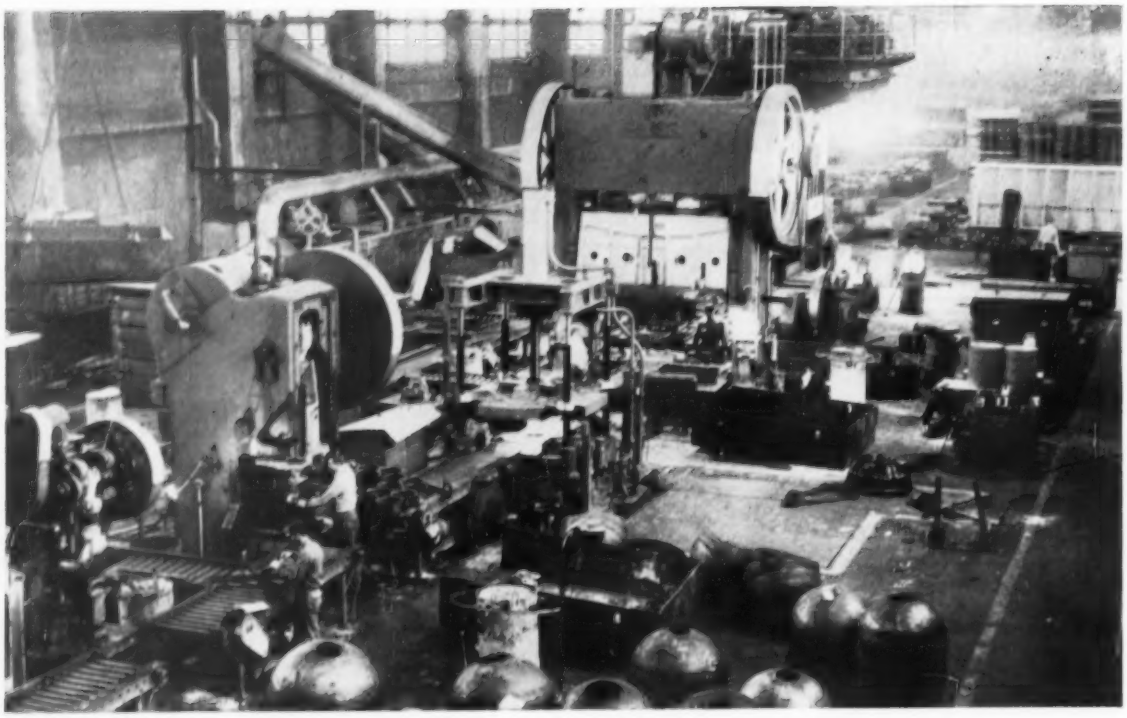
The fixture is mounted on the table of an ordinary gear hobber whose saddle *a* can be moved longitudinally on the bed *b*. The work spindle *c* is perpendicular to the saddle and carries the blank *d* which has been produced on a copying lathe. It is driven by a master elliptical gear *e* made by milling with a form cutter. The hob *f* and worm *g* are mounted on a slide (not shown) which is movable only in the vertical plane: that is, in the direction of the spindle.

The hob must be of sufficient length but, otherwise, a standard hob for circular gears is employed. It should have the same pressure angle as the milling cutter used to produce the master *e*. The form of the worm thread is the same as the cutting contour of the hob. Worm and hob have the same PD, but the major dia of the hob is slightly larger than that of the worm to provide the bottom clearance.

Hob and worm are coupled together by sprockets *h* and *j* and chain *k*, or by gears with a 1:1 ratio. For setup purposes, the hob and worm can be turned, relative to each other, so a cutting tooth of the hob will coincide exactly with the corresponding part of the worm in mesh with the driving gear. Hob and worm have an inclination to the spindle corresponding to the helix angle of the hob in the same way as when cutting conventional gears.

The attachment is driven from the hob spindle. The contour of the hobbed gear is generated by the link mechanism comprising arm *m*, link *n*, and pivot *o*, which causes the slide *a* to reciprocate in relation to the hob during rotation of the work spindle.





DOMED PARTS like mine casings, heavy-wall straight shells, ribbed baseplates for heavy appliances and similar items are contract stamped at speeds up to 200 pc per hr

Master board controls contract-

By means of a routing, or operation sheet, the foreman sets up on a master control board the presses, washing and heat-treating equipment to be used and the direction of conveyor movement. The line of blanking, drawing and secondary-operation presses for 16-gage and heavier stock is therefore highly versatile for production of large or short runs in minimum time

To avoid the handling costs customarily involved in contract stamping, the By-Products Steel Co, a division of the Lukens Steel Co, Coatesville, Pa, has set up a press line and auxiliary equipment that feature:

1. A system of *reversible* power-driven roller conveyors connecting the various pieces of equipment—first-operation presses, washer, annealer, and second-operation presses. These conveyors can be preset for direction.

2. A master control board and a master switchboard that tie together these pieces of equipment into a versatile machine. As a consequence, the department can be operated exactly as required for a specific product. Work routing and direction of conveyor travel are preset by pushbuttons on the master control board. In-process handling and stacking are avoided. Labor requirements are minimized. And, if desired, the automatic sequencing feature can be dispensed with, so any piece of equipment can be operated alone.

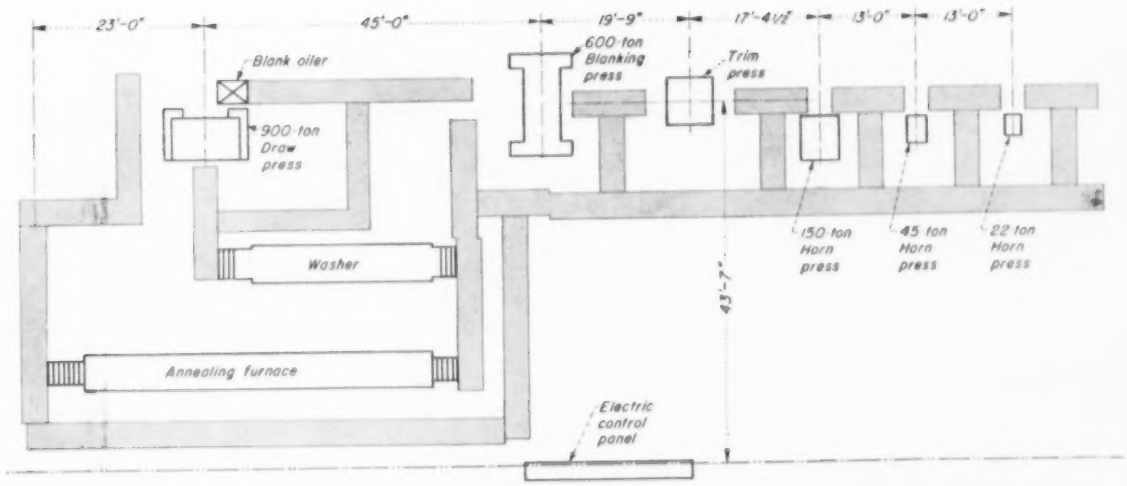
HEART OF THE OPERATION

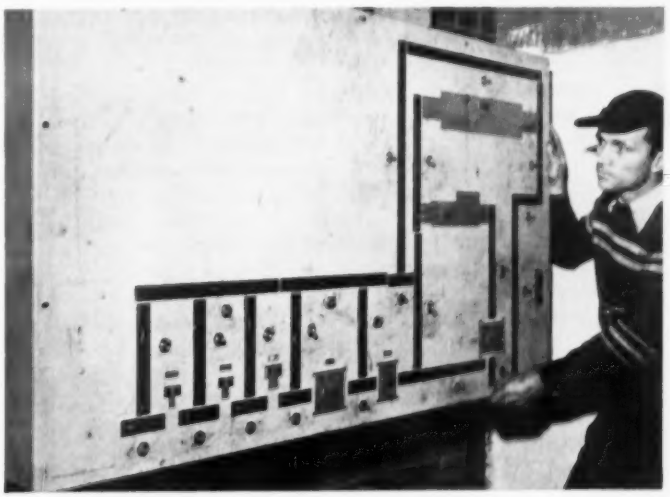
The Bliss S-2-600 blanking press is the heart of the stamping department. This machine was purposely chosen with enough tonnage and bed area to handle a wide variety of shallow drawing and beading operations, as well as blanking and flanging.

Flanged heads only, up to and including 48-in. dia, can be pressed. Flanged and dished heads up to and including 24-in. dia can be produced. Maximum draw is 8 in, limited by cushion stroke and capacity.

Maximum gage for pressing is 3/16 in.; for blanking, 3/8 in.

Advantage is taken of the 108x 60-in. bed area to increase ver-





MASTER CONTROL BOARD is a replica of the schematic shop layout. Conveyors are indicated by red; machines by blue. Toggle switches and indicator lights indicate direction of conveyor travel and which machines are in use, according to work routing sheet for the product

stamping line

RUPERT LE GRAND,
senior associate editor

satility of the press line. One, two or three dies can be set up in the press, and worked thus:

1-die setup—Blanks up to 30-in. dia by ⅜ in. thick can be cut, working the press from front to back, and sending the blanks by conveyor to the draw press, washer, perhaps the annealer, and then to the secondary horn presses.

2-die setup—For blanking, pieces up to 30-in. dia can be made in 0.209-in. stock. The second die would be used for punching.

3-die setup—Maximum blanking diameter is reduced to 25 in. in 0.209-in. stock. The blank might progress to the draw press, perhaps the washer, maybe the annealer, and come back to the rear of the press where it would be fed through one punching die for a large hole, then transferred to another die for say a concentric ring of bolt holes and then out the front of the press to a loose conveyor that connects to the trim press.

The 900-ton draw press (Baldwin-Lima-Hamilton SO-610-1006) accepts a blank up to 59-in. dia. Maximum head diameter that can be pressed is 40 in., because the inner slide measures 41x41 in. Maximum depth of draw is 22 in. because stroke is 26 in. and the knockout moves 24 in. Plate up to ⅜ in. thick can be drawn, but shell diameter is limited by the press tonnage.

To speed operation of the draw press and give better drawing results, Lukens engineers developed the blank oiler sketched. In addition, they are contemplating the installation of an 'Iron Hand" to remove shells from the rear of the press.

Work flow from the draw press can be arranged to flow automatically in three ways:

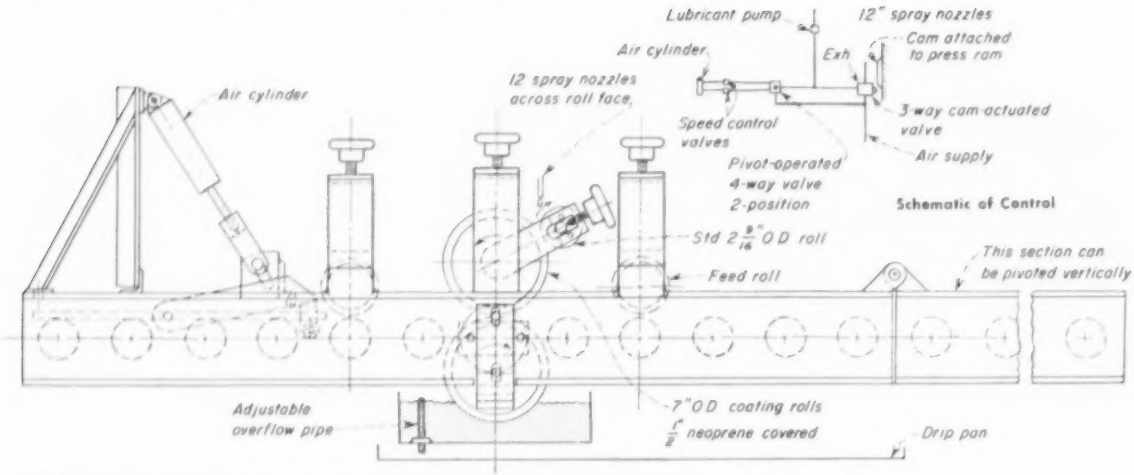
1. Shells move via conveyor to the washer for removal of drawing compound, thence to the blanking press for secondary piercing operations, the trim press and the horn presses.

2. Stampings can progress to the washer, the annealer, thence to the blanking press for hole punching, and finally to the horn presses.

3. If work must be stacked for some reason, it can progress through the washer, then the annealer, and finally be removed to temporary storage by lift truck.

Mechanical application of draw-

Master board controls contract-stamping line . . .



BOTH SIDES OF THE BLANK are oiled before it is automatically moved into the draw press after the drawn shell is removed. The upper coating roll runs in contact with a doctor roll onto which nozzles meter the drawing compound or oil. The lower coating roll is partially submerged in the run-off oil to coat the under side of the blank

ing compound to blanks will save enough to pay for the equipment in a short time. As compared to hand swabbing, about 50% as much oil is consumed. In addition, the operator can work the draw press faster, because the blank is oiled and fed into the press automatically.

The blank oiler has three functions:

1. To store a stack of blanks on a tiltable end section, and feed them to the power rolls, as that section is tilted.

2. To oil the blank by passing it through two large Neoprene-covered rolls supplied with lubricant by 12 nozzles above a doctor roll. At each press stroke, the nozzles emit from ¾ to 1½ oz of lubricant.

3. To feed blanks one at a time to the press in accordance with the press cycle. An air-operated stop lifts out of the way to let a blank move through into the die. Centering rollers at the sides of the oiler constrain the blank to move toward the die in proper alignment.

Oil is removed from drawn shells by means of a Blakeslee degreaser, which can be operated at speeds from 3 to 9 ft per min. At a grated area, the shells are turned over to drain. Stampings are discharged clean and dry, because a gas-fired drying section is provided.

Repairs to the Amsler Morton annealing furnace are minimized by providing three heat zones. The first warms up the work and the stainless-steel conveyor belt, the second raises the temperature to 1300 F normally, and to 1600 F if needed, while the third zone allows the work and belt to cool down. This arrangement prevents thermal shock on the belt, which is expected to have a 15-yr life as a consequence. Belt speed can be varied between 6 and 40 ft per minute.

Trimming of drawn work is handled in an HPM hydraulic press that will take a Brehm trimming die of the "shimmy type" capable of handling parts up to 24-in. dia by ⅜ in. thick. Other trimming dies are also available for this press.

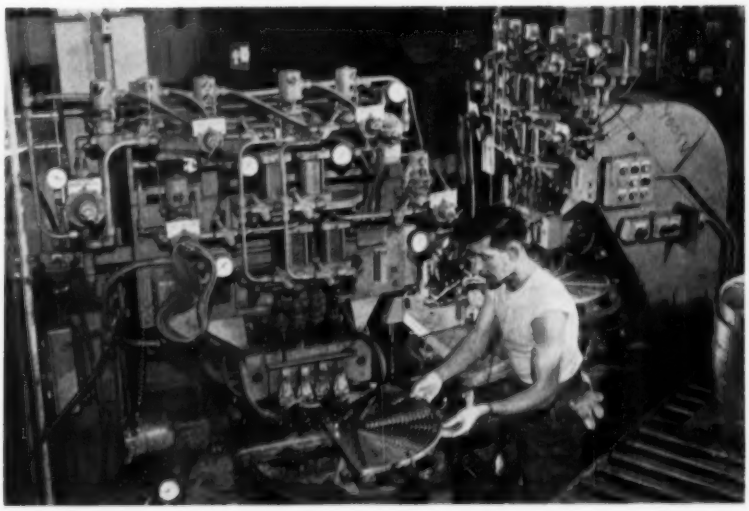
Secondary operations are performed on a battery of Bliss horn presses. Punching and embossing around holes are the kinds of operations done here.

Conveyors were supplied by Matthews. The Lukens engineers preplanned spacing of the hold-down bolts for permanently installed roller-conveyor sections, and allowed room for removable sections to handle variations in operation of the equipment. Deflectors are installed on conveyors to change the direction of work movement: for example, to make a right-angle turn onto another conveyor, or off a conveyor.

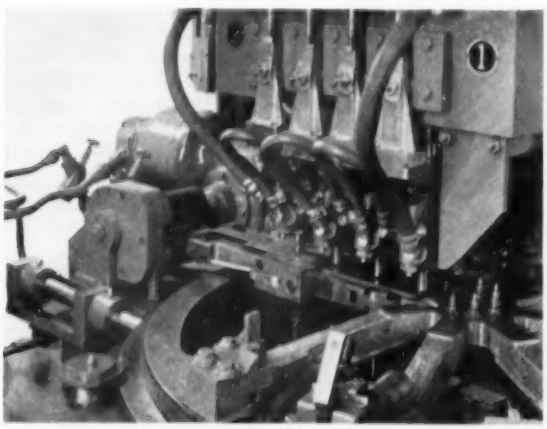
Deflectors consist of angle-irons laid across conveyors at an angle and secured by clamps.

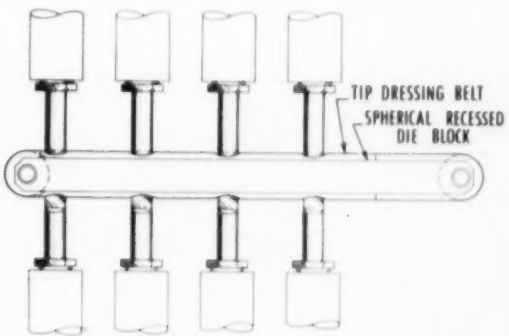
ANGLE-IRON DEFLECTORS shunt compressor housings from one conveyor line to another

REFRIGERATOR SHELVES are stiffened by five channel ribs spot-welded to the underside. Each rib is welded at four points spaced 2⅜ in. apart



SIX-STATION WELDING MACHINE (five welding stations and loading) can handle 120 shelves per hour at peak rate. One operator can handle two machines, loading them alternately. Loading time is about 10 sec





MECHANIZED TIP-DRESSING ATTACHMENT is located at loading station. Abrasive belt operates over die block with spherical recesses to match required contour. All eight tips are brought into contact with belt at once, at reduced pressure

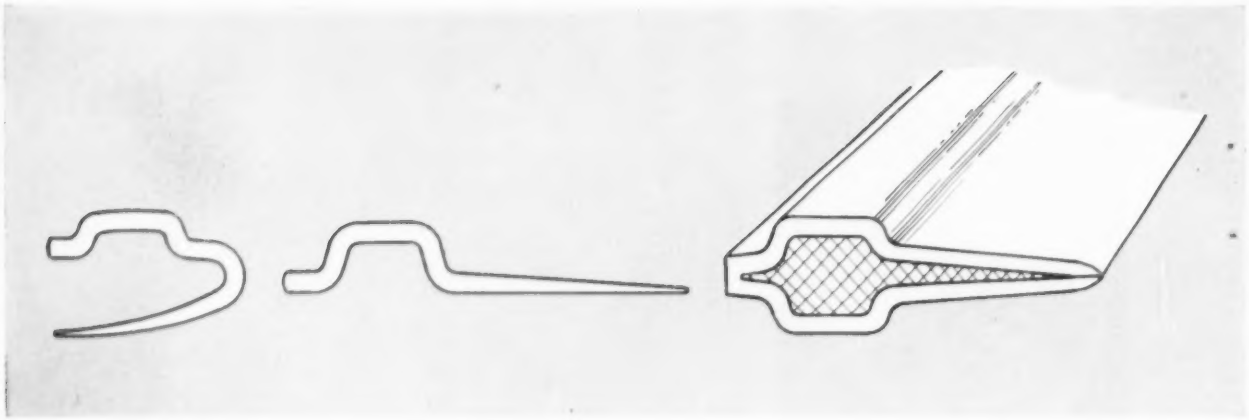
Spot-welded ribs make aluminum shelves . . . Stiff in 30 seconds

Problems with electrode pick-up, common in spot-welding aluminum and other highly conductive materials, have been reduced at GE's Appliance Park (Louisville) in resistance-welding stiffening ribs to semi-circular refrigerator shelves.

To provide low inertia characteristics, rams have an anti-friction ball-guided design with internal spring follow-up. Electrodes have polished spherical tips. Electrical current is alternating with both upper and lower electrodes live to reduce tendency for the work to shunt current away from the area of weld nugget.

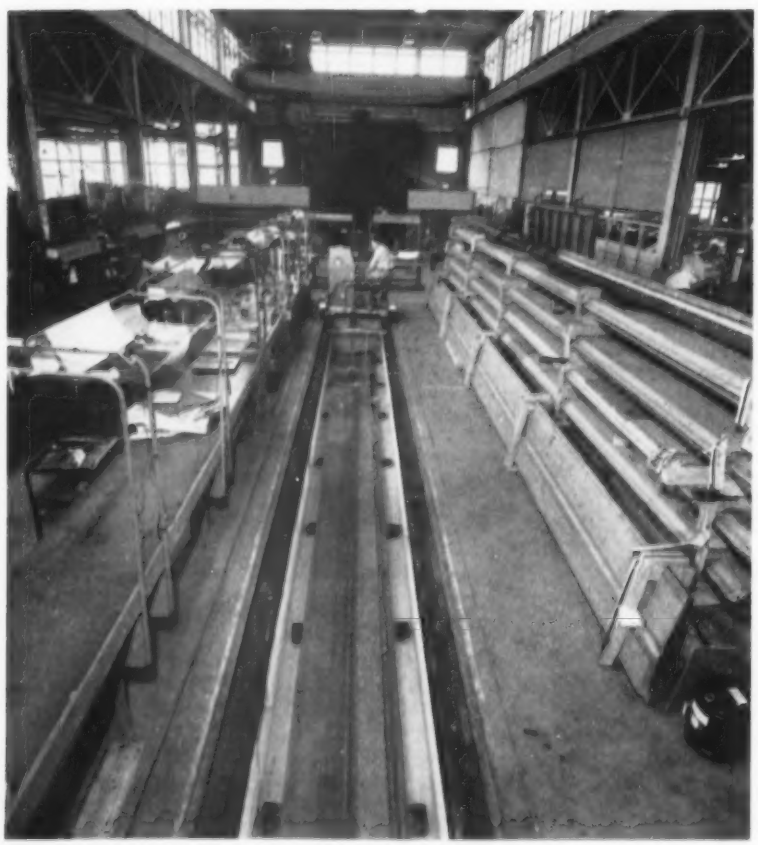
Pick-up that does occur is removed by a mechanized tip dresser built into the machine.

Eight special machines, two per operator, handle all production on the shelves, producing more than 800 per hour. The machines were designed for the operation by Precision Welder and Flexopress Corp, Cincinnati, and are included in the production line with the stamping, cleaning, and anodizing operations.



Helicopter blade halves extruded in this shape... are cold straightened to this shape... then joined to form completed blades after...

Ultrasonic rig tests helicopter blades



MAINTENANCE PIT IN THE SHOP was dammed to form a tank in which the work is immersed for test. Pit is 100 ft long, but only half is needed for the 40-ft blades

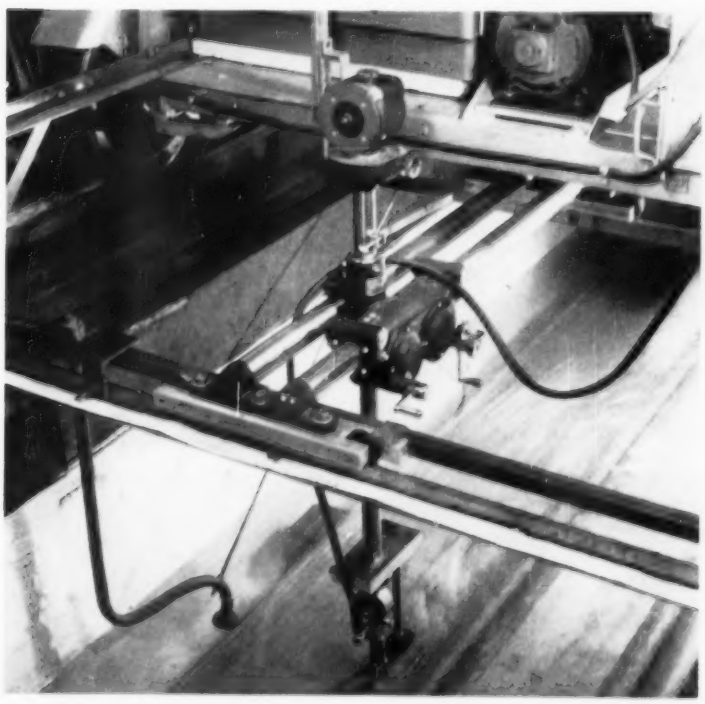
Ultrasonic testing poses an unusual problem on aluminum rotor blades for the YH-16A 40-passenger helicopters built by Vertol Aircraft Corp (formerly Piasecki Helicopter Co). Each of the eight blades on the turbine-powered transport is assembled from two aluminum extrusions.

Specifications require 100% ultrasonic inspection of the extrusions, requiring immersion for the test. Each aluminum extrusion weighs 1850 lb, is 40 ft long and 31 in. wide after straightening. Pending installation of inspection equipment at Vertol, the blades are inspected at Sperry Corp, Danbury, Conn.

Solution to the immersion problem was provided by a maintenance pit for Sperry's rail-inspection cars. This pit provided both the tank needed for immersion testing and the rails on which the test car operates.

With a 10.0 mc, ⅝-in. crystal mounted in a positioner on the test car, 117 longitudinal passes are required to provide 100% inspection of each extrusion for internal flaws. Sound extrusions are then shipped to Vertol for assembly and final machining to produce the 400-lb blade.

CHASSIS FROM AN ULTRASONIC TEST CAR rides on rails along pit. Ultrasonic test equipment with positioner is mounted on the chassis along with a ¼-hp adjustable-speed motor to drive the car at speeds of 2 to 32 fpm



TWO INDEX POINTERS maintain constant crystal position. Lateral position is maintained by spring-mounted index riding the edge of blade. The other index is a free-floating caster riding the top surface; it is fixed to the positioner to maintain constant distance between work and crystal

Tubing bent with nylon mandrels at Douglas Aircraft

Tube-bending mandrels made from nylon rods have been developed at Douglas Aircraft Co, Santa Monica, Calif. Both heavy- and thin-walled tubing with diameters ranging from ¼ to 2 in. have been bent with the new approach.

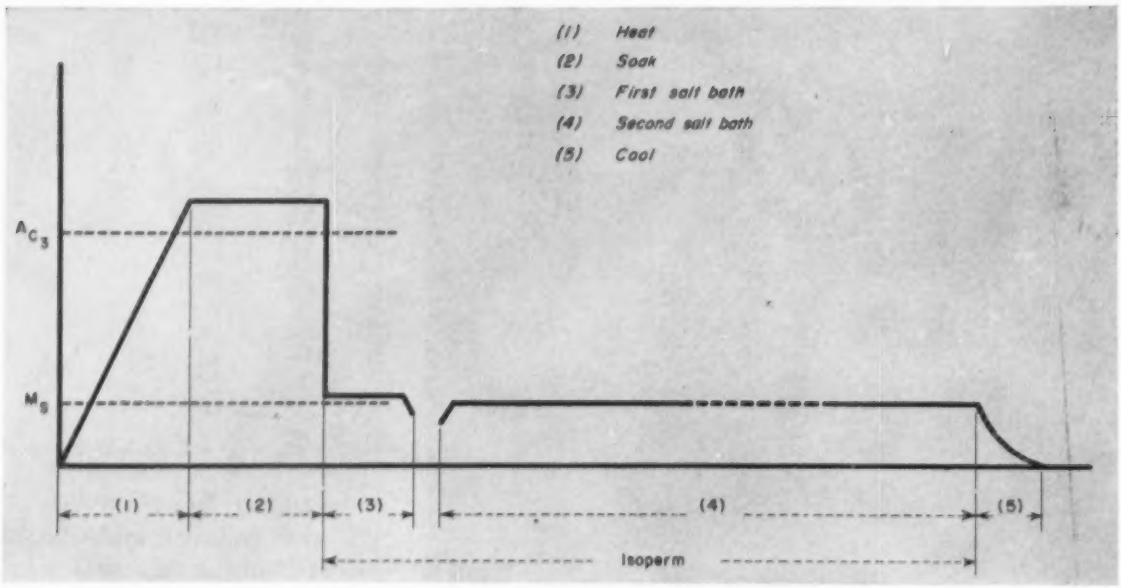
For some applications, bullet-type mandrels are inserted in the tubing to a spot just below the point of bend and remain stationary as the tube is drawn.

More often, segmented mandrels that travel with the tube around the forming shoe are required. These are made from a number of nylon disks or ball-shaped segments with a center hole. A flexible steel cable is threaded through the segments to form the complete mandrel.

A segmented ball mandrel of 1-in. dia is reported to cost about one-third as much when fabricated from nylon as when made from steel. The nylon can be cut, formed, and assembled in 5 hr, compared with seven days for delivery of a similar steel mandrel.

Abrasion resistance of nylon permits long life while the natural resiliency allows the mandrel to deform slightly in operation, distributing the load during bending cycles, reducing chatter and vibration.

Low friction coefficient of nylon makes the mandrels easier to insert and withdraw. Tensile strength of the Polypenco nylon rod is reported to be high enough to prevent tearing during bending.



A LONG HOLDING PERIOD in the salt bath characterizes the Isoperm process. Optimum period is about 10 to 12 hr. Work is quenched into a bath (item 3) that reduces the temperature to approximately the M_s point; then transferred to a holding salt bath for further transformation. Process may be adaptable to tool steels, constructional steels and casehardened steels

Isothermal quenching in salt

Italian engineers are exploiting an Isoperm treatment, or prolonged quenching-tempering process, that improves the life of high-carbon, low-chromium drills by 5 to 7 times

A new wrinkle to quenching in salt appears to have been developed in Italy. The process involves two baths. The alloy steel is heated in a high-temperature furnace, then plunged into salt at a temperature held slightly above the M_s point (the start of transformation to martensite, or the hard constituent in tempered steel). See diagram. Next, the work is transferred to a holding bath maintained apparently at the M_s temperature and kept in the salt for 10 to 12 hr in order to obtain maximum toughness at little sacrifice in hardness.

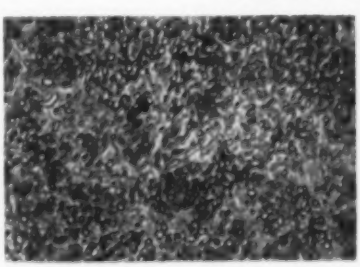
The prolonged tempering cycle produces a structure which the inventors claim is a dispersion of bainite in fine martensite. However, it is thought that the structure is actually tempered martensite, for two reasons: first, the accompanying photomicrographs do not clearly show the presence of bainite, and second, the long-cycle tempering bath is operated well below the accepted austemping range, which produces bainite.

Regardless of all this, results are what count. Inventors Dainelli and Tavolazzi say that the "Isoperm" process is in full commercial production at Utensileria Italiana Tavolazzi & Fumagalli, Missaglia (Como), Italy.

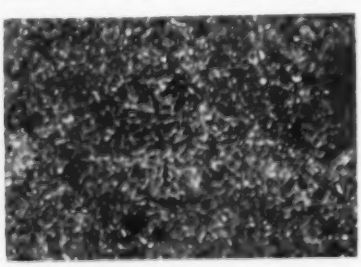
The Isoperm process is an isothermal one. In the United States, three isothermal treatments are recognized:

Martempering — Quenching an austenitized ferrous alloy in a

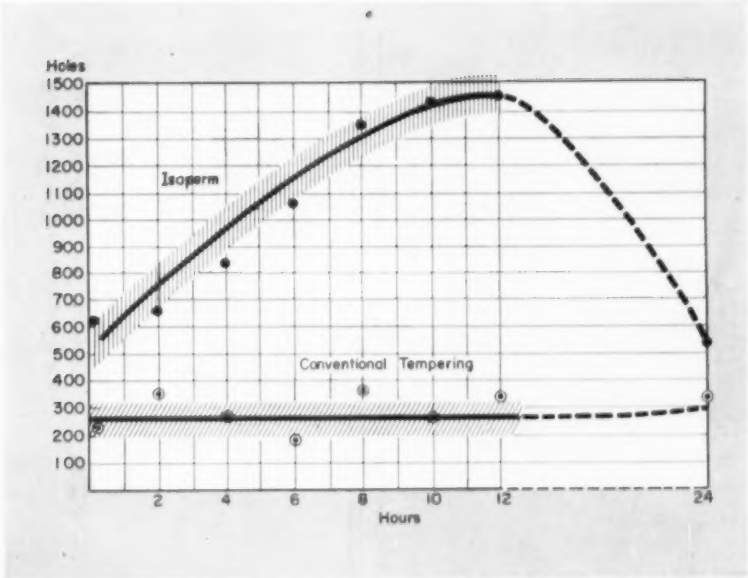
Structures Produced by Tempering vs



OIL QUENCHED, tempered 30 min at 340 F. Structure: fine carbides disposed in fine martensite



OIL QUENCHED, tempered 8 hr at 340 F. Structure: fine carbides in fine martensite



CONTINUOUS IMPROVEMENT of tool life occurs with the Isoperm process until a 12-hr treatment is reached. Not only is the tool life much greater than for conventionally tempered drills, but also for the case of ordinary martempering (beginning point on upper curve)

increases tool life

DIEGO STRANIERO, McGraw-Hill World News, Rome

medium (salt) at the upper part of the martensite range, or slightly above that range, and holding in the medium until the temperature throughout the alloy is substantially uniform. The alloy is then allowed to cool in air through the martensitic range. The alloy can then be tempered if desired. Resultant structure: martensite or tempered martensite.

Austempering—Quenching (into salt) and holding until transformation is complete, at a temperature below that of pearlite formation and above that of martensite formation. Resultant structure: bainite.

Isothermal Quenching and Tempering—Quenching into salt at a temperature within the range of martensite formation and reheating in salt at a higher temperature and cooling in air. Resultant structure: tempered martensite and bainite.

The results obtained in Italy with Isoperm are reported in connection with a high-carbon, low-chromium tool steel that is used as a drill steel. Composition of the steel is: 1.04% carbon, 1.52% chromium, 0.35% silicon, 0.40% manganese, and 0.025% of both sulfur and phosphorous. Ordinary formulas for calculation of the M_s point presumably do not apply to this steel because of its high carbon content. Inventors Dainelli and Tavolazzi point out that it is difficult to ascertain the M_s point of steel, when it was drawn to their attention.

Comparative drilling tests show that Isoperm-treated drills produce several times as many holes as those quenched in oil and then tempered. Commercial twist drills of 13 mm (0.511 in.) dia were made and subjected to these heat-treatments:

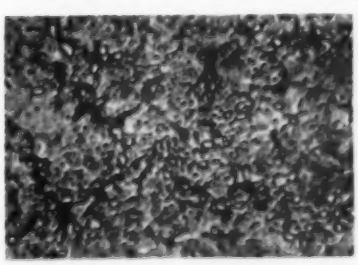
1. Heat to 1560 F, quench in oil, temper at 320-340 F for periods of 15 min. to 24 hr. This may be called the "conventional" method, except that long tempering times were added to ascertain whether they have any appreciable effect.

2. Heat to 1560 F, quench in salt at 340 F and hold for periods from 15 min to 24 hr. This is the Isoperm method.

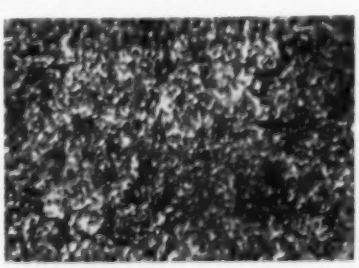
The 13-mm drills were tested on annealed alloy-steel plate (UNI 100 C 6). This material is reported to have a tensile strength of 65 to 70 kg/mm² (92,000 to 99,000 psi, and therefore presumably related to the heat-treated condition). Drills were run at 375 rpm or a cutting speed of 15.3 m (50 fpm) and a feed of 0.06 mm per rev (0.0024 ipr) in one set of tests, and at 530 rpm or a surface speed of 21.6 m (71 fpm) and the same feed for another group of tests. Results of the tests are summarized in a table.

A marked effect on tool life is produced by quenching into salt and permitting the drills to re-

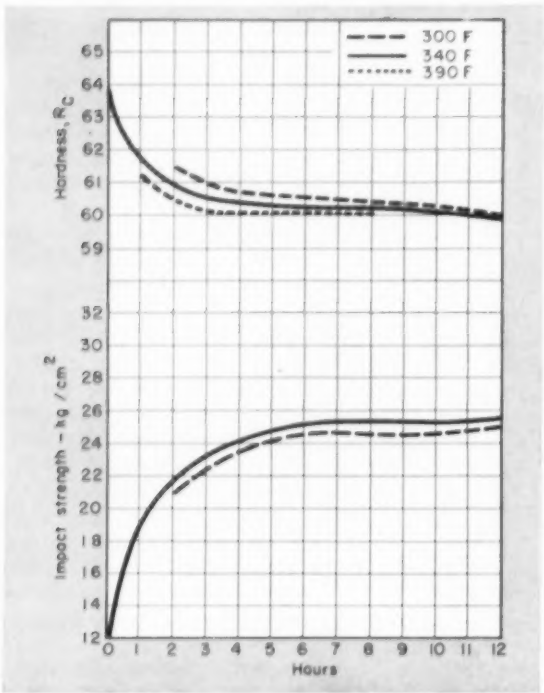
Salt-Bath Treatments. Magnification: 1000 X



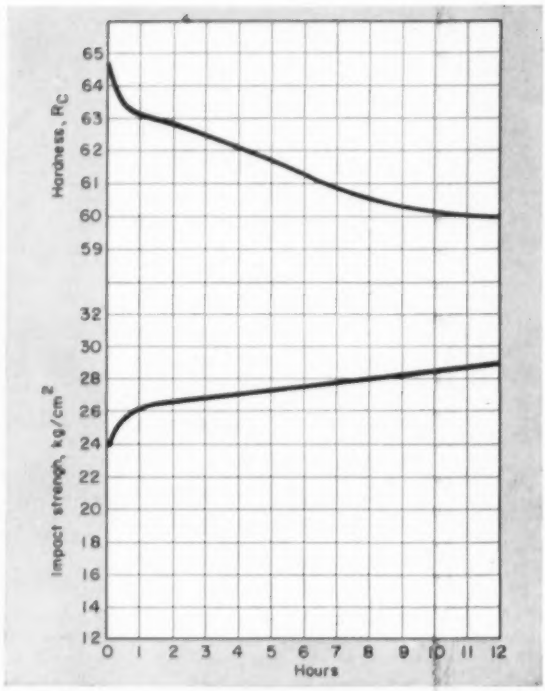
MARTEMPERED at 340 F for 2 min



MARTEMPERED at 340 F for 8 hr



TOUGHNESS of oil-quenched steel increases slowly with tempering time



MARTEMPERED STEEL develops toughness quickly and to a greater extent than steel conventionally tempered. Bath temperature: 340 F

main for 10 to 12 hr. Tests *A* in the table reveal that there was no marked change in tool life when the drills were oil quenched and then tempered for various periods up to 24 hr. And the hardness was likewise not much affected. But a change is noted when even a short-time martempering operation is performed. For 15 min in the salt bath, the number of holes drilled is 610, as compared to only 219 for a 15-min temper after oil quenching. The real significance of the Isoperm treatment becomes apparent when one sees the results of holding in the bath for 10 to 12 hr. Now, about 1400 holes can be drilled, or up to seven times as many as produced with conventionally treated tools. Treatment for more than 12 hr impairs tool life.

Toughness is another property of steel that is enhanced by the Isoperm process. If the steel is quenched in oil and tempered, the impact strength reaches a maximum in 6 to 8 hr (in this case about 25 kg/cm²), and the hardness drops from R_C64 to about R_C60. With martempering, on the other hand, toughness in the order of 24 kg/cm² is secured with a few minutes immersion in a salt bath and reaches 28 kg/cm² in 8 hr. The 8-hr. treatment reduces the hardness to R_C60.5 and the optimum time of 12 hr reduces the hardness to R_C60.

The prolonged treatment is carried out in Italy by the use of two furnaces. One is a martempering, or quenching, furnace which has cooling means to avoid an undesirable temperature rise when a large number of pieces are rapidly quenched. The second furnace is insulated to prevent heat loss during the long-cycle soaking while the structure is refined.

Effect of Isoperm Treatment on Drill Life

	Tempering Time, Hr							
	¼	2	4	6	8	10	12	24
Tests A: 375 Rpm — 50 Fpm — 0.0024 Ipr								
Quenched in oil tempered at 320-340 F								
Rockwell Hardness	60	59	60	59	59	59	58	58
No. holes drilled*	219	343	274	178	355	253	336	381
Isoperm quenched in salt at 340 F								
Rockwell Hardness	60	59	59	59	58	58	58	58
No. holes drilled	610	658	835	1067	1355	1413	1457	510
Tests B: 530 Rpm — 71 Fpm — 0.0024 Ipr								
Quenched in oil, tempered at 320-340 F								
Rockwell Hardness	60	59	60	59	59	59	58	58
No. holes drilled	3	3	5	4	4	3	5	7
Isoperm quenched in salt at 340 F								
Rockwell Hardness	60	59	59	59	58	58	58	58
No. holes drilled	9	14	18	19	29	30	30	5

* *Plate thickness—20 mm or 0.787 in.*

American Machinist

SPECIAL REPORT NUMBER 424

Performance of the M59 is better, cost is less because...

These assembly ideas save you money...

. . . you, as a taxpayer, that is. Why not as a shop executive, too? A year ago (*AM*—Mar 14 '55, p128-132), we described how the Ordnance Div, Food Machinery & Chemical Corp, San Jose, Calif, designed and is building the M59 armored infantry vehicle for less than half the cost of its predecessor, the M75. Performance is far better, too. We showed then the automated machining line and a little of the welding. Here are more welding, other assembly, and plant-service ideas to prove that design for production saves

E J TANGERMAN
executive editor

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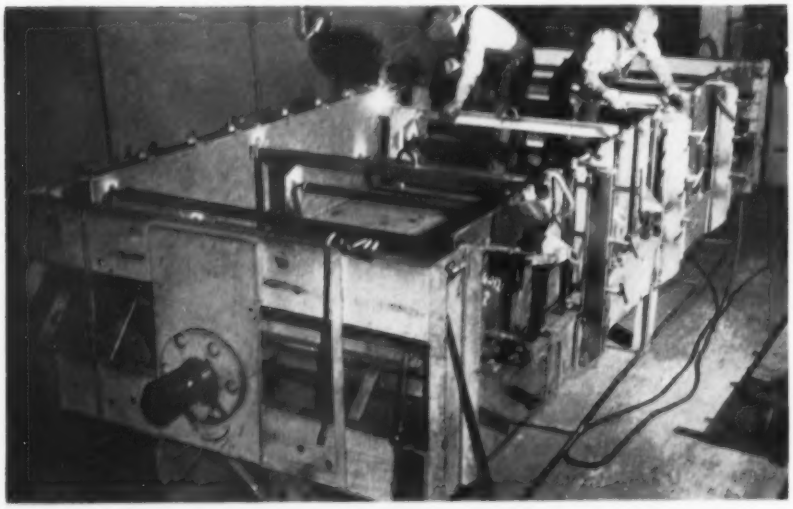
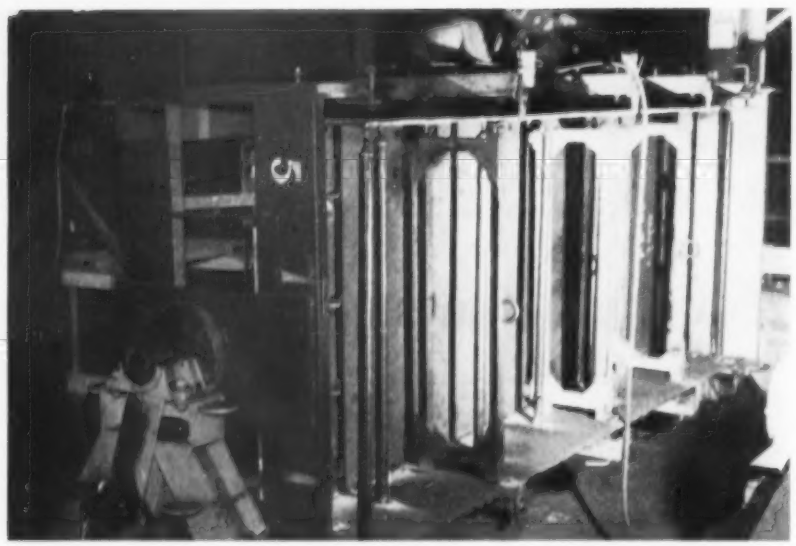
Welding is All Downhand . . . in Trunnioned Fixtures,



Two steel "scows" . . .

the larger upside down over the smaller, form the tank hull. The two are welded up separately, then put together, all operations being done in huge trunnioned fixtures. Here elements of the lower hull are positioned in a fixture and tacked into place by means of reusable bulkheads. Note trunnion axle at end of fixture and lifting handles on bulkheads



Downhand welding . . .

is the order of the day throughout. The trunnioned fixtures make this easy. Here welding is underway on a lower hull. Note how plates are positioned exactly and held rigidly during welding with bulkheads and simple screw-jacks made of pipe tackwelded at the end opposite the screw. Screw clamps and locating pins are built into the fixture as well

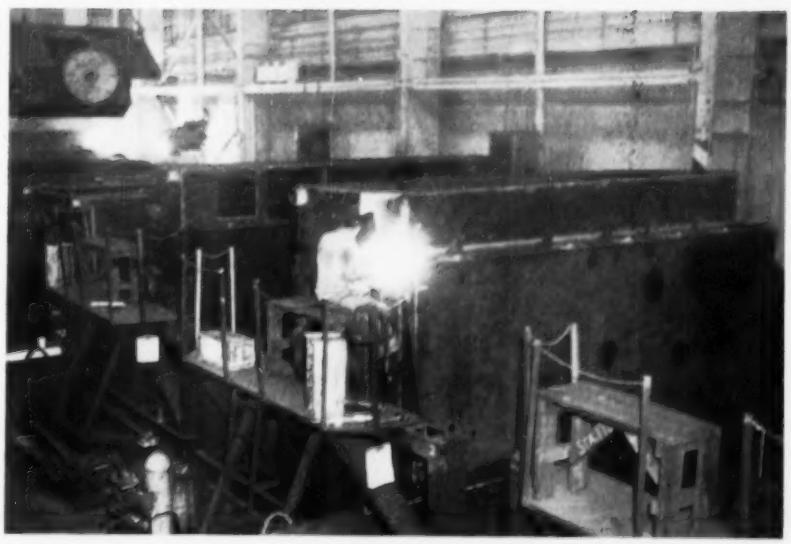
Upper Hulls are similarly assembled . . .

in trunnioned fixtures. Basic components are put in the box fixture while it rests on the floor, bulkheads are located and tacked in, some small parts added, then the fixture lifted onto trunnions which have platforms at proper levels. Precut components are stacked next the fixtures, jacks at the end

Some Powered . . .

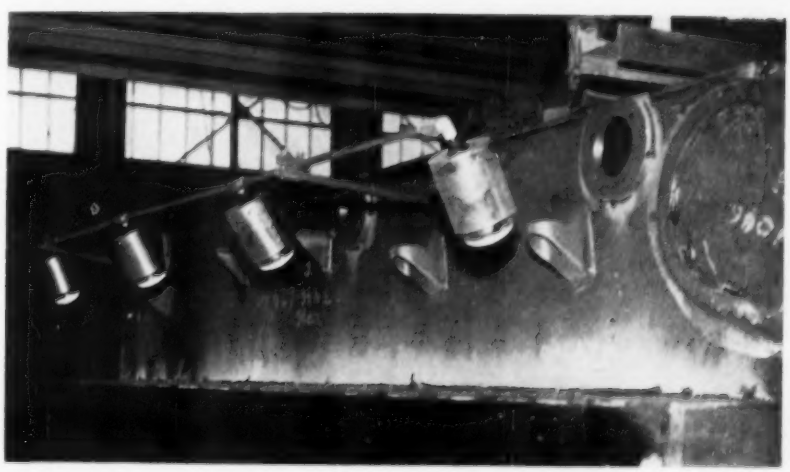
Sponsons join the hulls . . .

(The sponson is the long plate on which welder at left is leaning.) The lower hull (here shown on top) requires extensive machining for track bogies and other elements. This is done in a big transfer machine (*AM*—Mar 14 '55, p130-131) after heavy welding, to avoid distortion troubles. Welding here is all done downhand, just as at other points. Narrowness of the lower hull provides space for the tracks



Final welding . . .

again is done on trunnions, but here the assembly has become so heavy that power turning is required. Note the worm-wheel trunnions on one end of the tank in the air at left and at far right background. They are driven by motored wormwheels built into the rear trunnion support. Dead trunnions are bolted on near ends. No fixture is required because the assembly is now rigid. An outsize fork truck takes the assembled tank to paint lines and elsewhere, is much faster than crane handling. Time is 3 min, compared with 22 min for crane and cross crane, to paint area



Infrared lights hold heat . . .

during down periods and overnight. Armor plate welds much better if preheated and held at temperature. Rigs like this are extensively used for the purpose. They are made up of conduit and standard sockets, ganged as required, and with suitable brackets. The protectors are No. 10 tin cans, bushed to the sockets

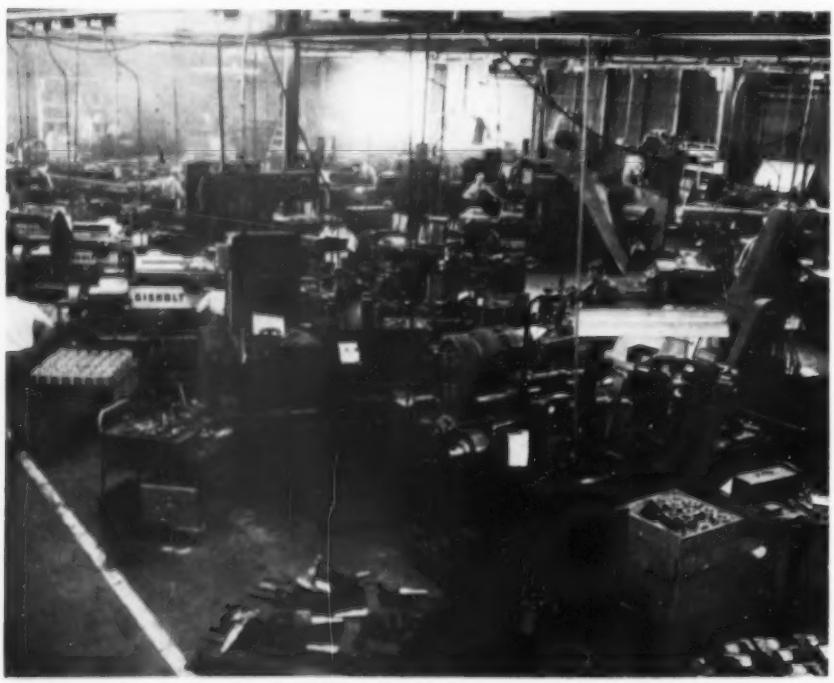
Three Quick Ideas that You Can Use

Minimized fire hazard . . .

when completed vehicles are run out, is achieved by supplying fuel from two 5-gal GI gas cans mounted on legs over the engines. This avoids the danger of a small amount of gas in large tanks. The little tanks provide enough fuel to start engines, try the vehicle, and run it out of the building. Very extensive testing follows, through a pond, mud, and up steep slopes

Prebagging parts . . .

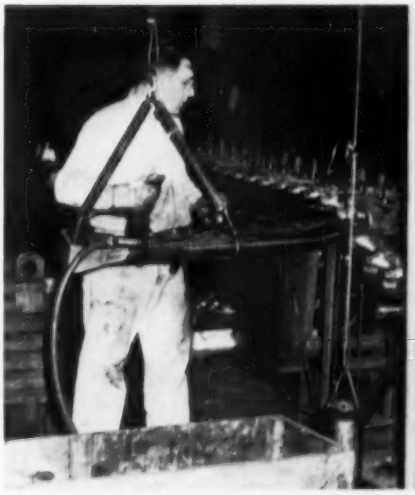
by subassembly and assembly units saves a lot of stock handling, damage, and misplacing, makes inventory easy. Bagged parts carry printed identifying labels, are packed in palletized carrying cases, handled easily by fork truck. Cases have hinged fiberboard half-tops to keep trash and dirt out, are tagged with assembly number

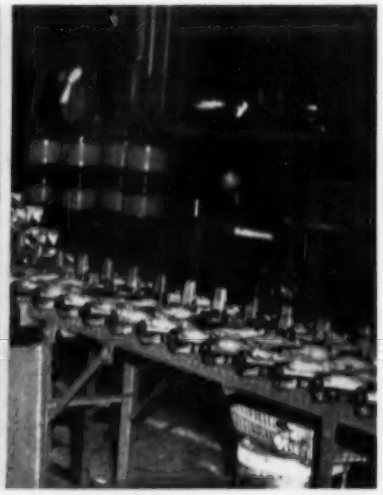


Foreman's office is elevated . . .

over the machine shop, so he can get a quick general picture. Here is his view of one machining area. Office is centered over timekeeping and stock-control rooms, a common practice in West Coast aircraft plants where headroom permits

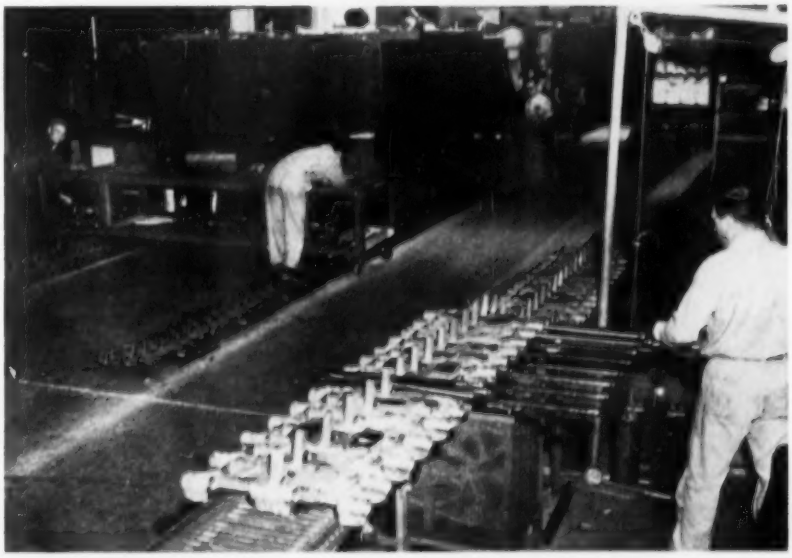
Proximity and Power Tools Minimize Subassembly Problems





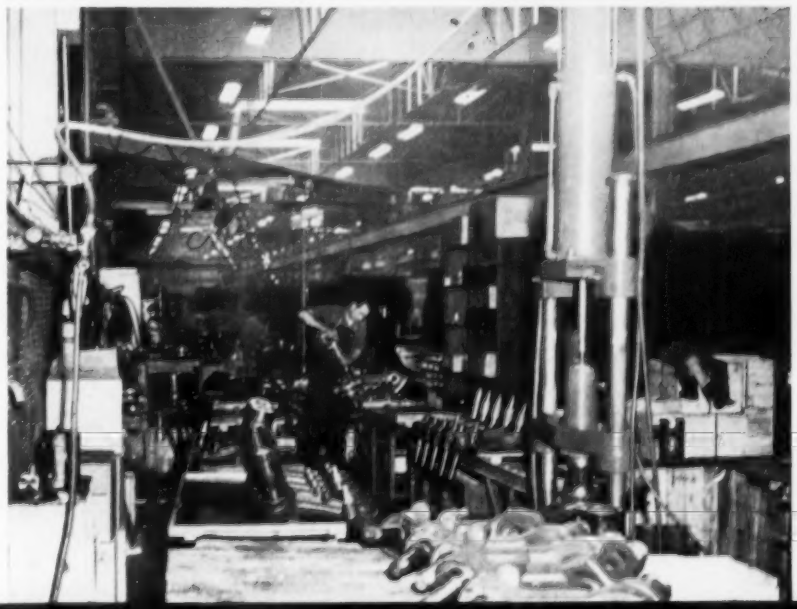
To avoid track-joint trouble . . .

nightmare of tank operation . . . track shoes are joined by octagonal pins inside rubber bushings . . . in effect, there are no moving parts for dust to enter. Shoes roll down this conveyor from left rear, nest automatically. A dip in the conveyor (7° of angularity) places bushings in position so the operator can force pins in with this air cylinder. Further details in next picture (below)



Assembled tracks . . .

are laid on the floor and the tank drawn onto them by means of the track itself, aided by two air-operated winches. Winches are mounted in a castered table which butts against the tank end, rolls back on its casters with the tank as the track is pulled on. Meanwhile, the table carries tools and is a safety device to keep assemblers clear. Note (right) how track is subassembled at point of assembly, and counterbalance for air cylinder shown in previous picture

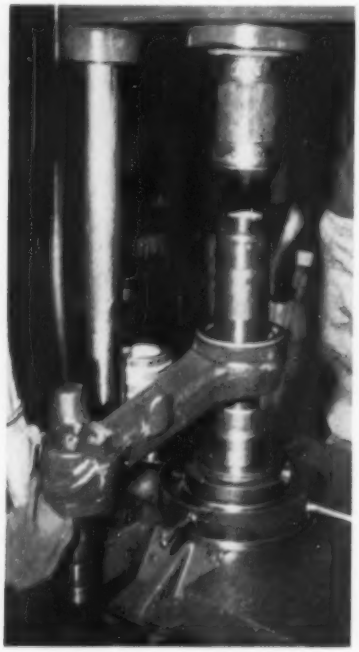


Track bogie arms . . .

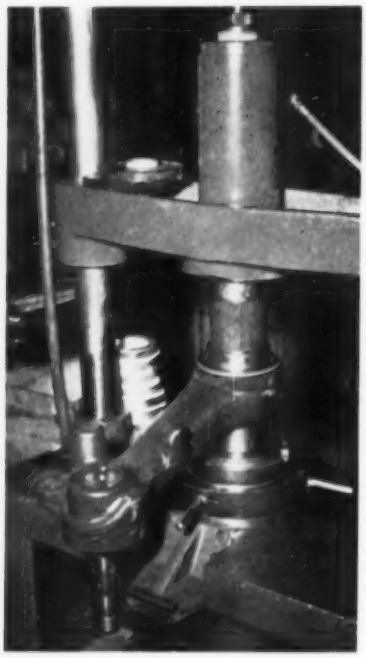
a good case study, are assembled in this compact area right beside the point on the assembly line (right) where they go on. This permits concurrent operation, forces close coordination between subassembly and assembly. Any troubles with the assembly are checked, therefore are nonrepetitive. (This is a basic principle used all along the line.) Here, assemblies begun at the air press (right foreground) are moved on pallets to wrench fixture (rear center) where a high-frequency impact wrench is being used to set cover capscrews. The assembly is lifted by the electric hoist on jib crane to a carrier which takes it to final assembly. On the next page, see the assembly step by step . . .

Here's How the Track Bogie Arm is Assembled . . .

First . . .
bearings and spacer are placed over the ram of the air press, a pressure collar on the base spud



Second . . .
bogie-arm forging, with trunnion up, is set over spud, aligned with ram



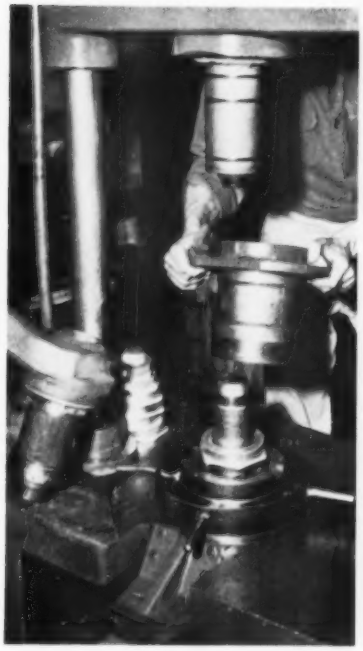
Third . . .
head of air press is brought down, forcing bearings and spacer over trunnion

Seventh . . .
arm with trunnion end assembled is placed in spindle-end assembly fixture, in which air rotation of central element locks it

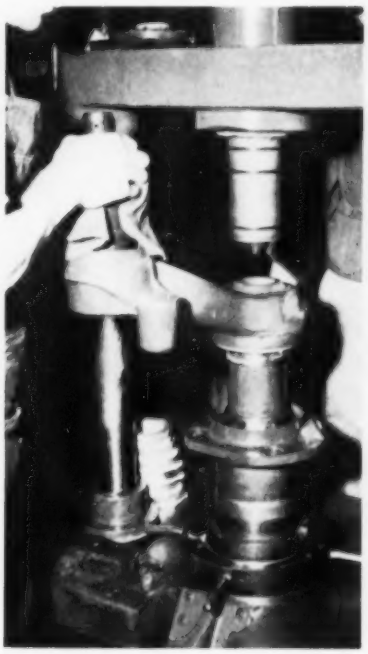
Eighth . . .
subassembled road-wheel hub is placed on cleaned spindle end

Ninth . . .
Oil from a metered source is added to hub, then cover is added and screwed on (see general view)

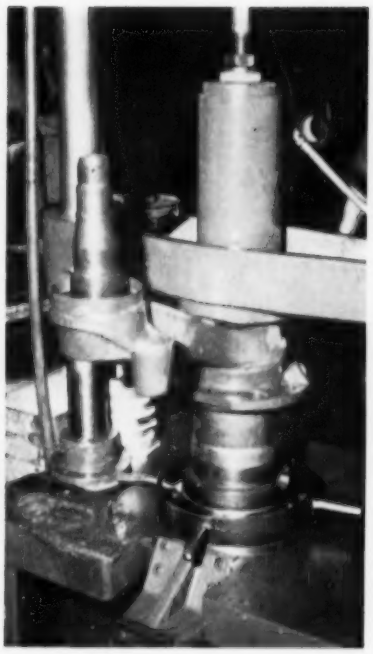
Right Beside the Assembly Line



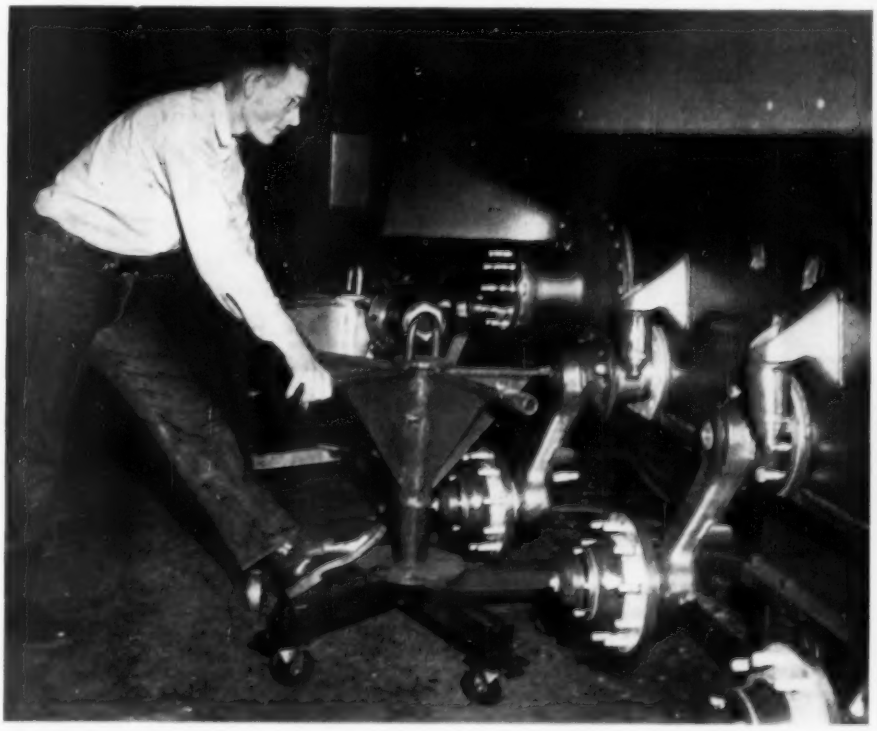
Fourth . . .
nut replaces collar on base spud with frame-body housing over *b*. Trunnion rests on soft pad to protect threads



Fifth . . .
bogie arm is set into housing and pressed down. Note guide tit on ram which centers assembly



Sixth . . .
nut is tightened by ship's-wheel wrench built into base spud. Note auxiliary cylinder in head; it expands a sleeve to clamp bearings in Step 1

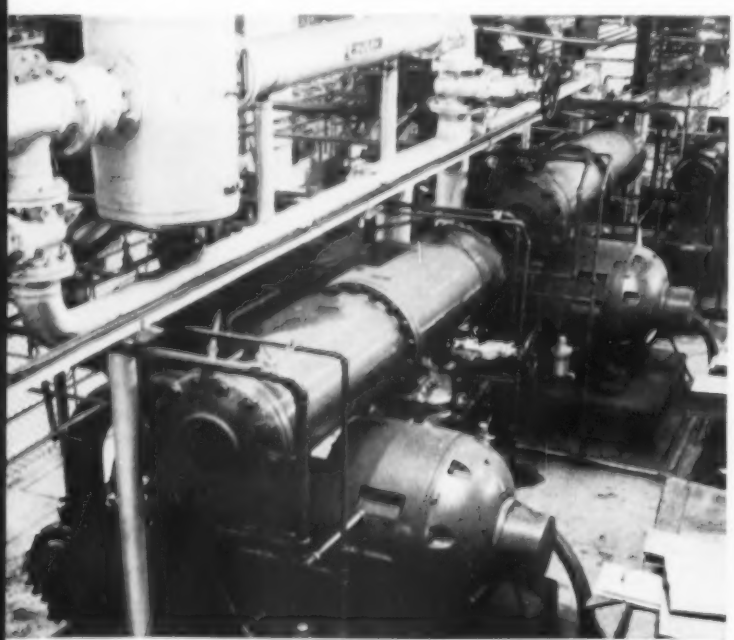


Assembled bogie arm . . .
is lifted by hoist and placed on 5-castered carrier in position and at height for assembly. The carrier is simply rolled over to the tank, a few feet away, and the bogie arm trunnion set into socket. Then bolts are placed and tightened by impact wrench. Gang drilling and tapping of holes around socket assures proper fit

Building Services *Are* Services, Not Invalids

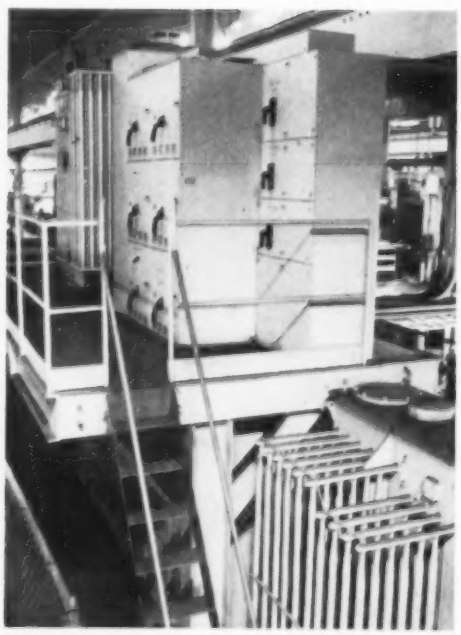
High lighting intensity . . .

55 ft-cdle 3 ft above the floor anywhere in the shop, is provided by fluorescent fixtures on a 275-v system. This view is near the end of the assembly line



Air supply is from the middle . . .

of the 288,000-sq ft plant to minimize pressure drop. Two 225-hp Joy and one 200-hp CP compressors provide 100-psi air throughout the plant. The small unit has automatic pushbutton start, so compressed air is available for overtime work without requiring a special operator for service facilities



Transformers are centered . . .

in the plant to minimize line loss and voltage drop, and lines are adequate for any load, present or expected. There are 4500 kva of transformer capacity, three 1500-kva, 480-v unit substations with three 500,000-c/m feeders on each row of columns. Each column has 440-v, 3-phase, 60-cycle ac and 110-v, single-phase, 60-cycle ac available

Round Table

Snooper by Appointment

"I think my 'Inspector-at-Large' idea is going to work out fine, Ed. I've got Shields out today, making the rounds."

"Yeah; I saw him, Al. Maybe he'll turn up a few hazards you might not have seen, but I'll bet he'll make a vacation out of it. He's probably off in a corner, swapping jokes with a sweeper right now."

"You sure are cynical, Ed. You don't think a man will take a special job like this seriously?"

"Of course not, Al. It's a joke. You can't expect a production worker to give a damn about safety. You're losing a whole day's work just to give him time off. That's what it amounts to."

"I don't think so, Ed. I gave him a pretty good talk about safety this morning, and he was really starting to think about it. I picked Shields because his safety record is so bad. This day's tour will make him think about safety after he's back at his machine, too."

"You're liable to have your men bribing each other to be next on the list for the inspector job. Instead of once a month, you'll have to pick a man each day."

"Cut it out, Ed. This is the kind of thing a lot of big companies have done. It's worked out for them, so why shouldn't it work here? I think it's a good idea."

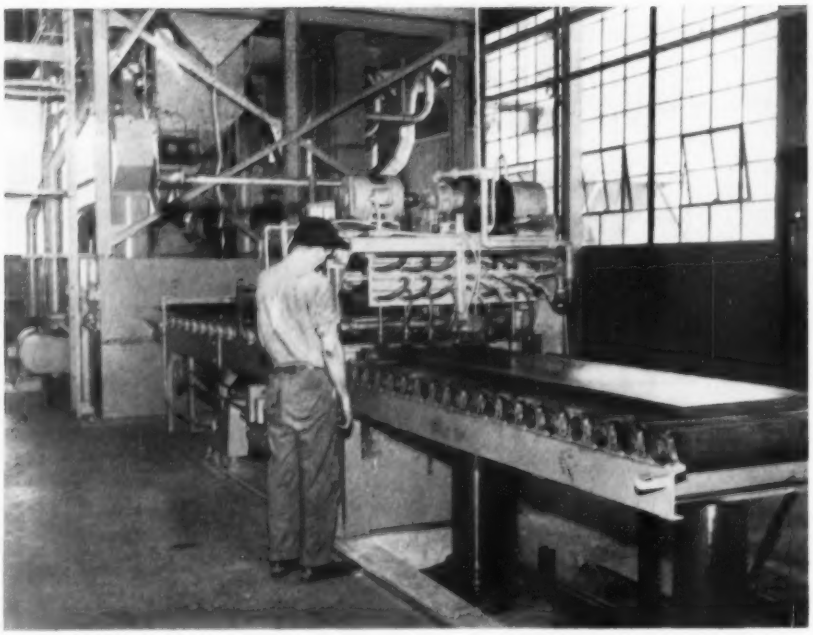
"Maybe they say it worked, Al; but you can never tell for sure. Besides, we have a safety committee that's supposed to look for hazards. You want to put them out of work?"

"They'll have plenty to keep them busy, even if I have a man out looking around once a month, Ed. You can't get too many of the workers hepped up on safety."

"OK, Al; go ahead. You're not wasting my time and men."

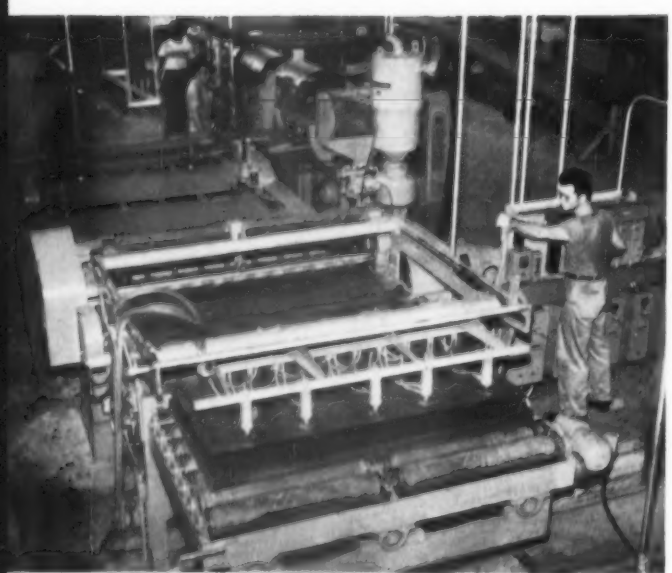
"You'll see that I'm right when we get our accident rate down, Ed."

***DOES** this sound like a good idea—having a production worker take off a day to snoop for dangerous hazards that the foreman's missed? Your ideas may help others. Discussions of earlier topics start on page 137.*



POWER CONVEYOR moves 7-ton bundle of sheet steel to feed station under vacuum-cup feeder. Hydraulic cylinders raise the bundle to Carando feeder which picks up one sheet at a time and delivers it to Wheelabrator for blasting both sides with steel shot to remove dirt and mill scale. This operation is performed only on sheet requiring it

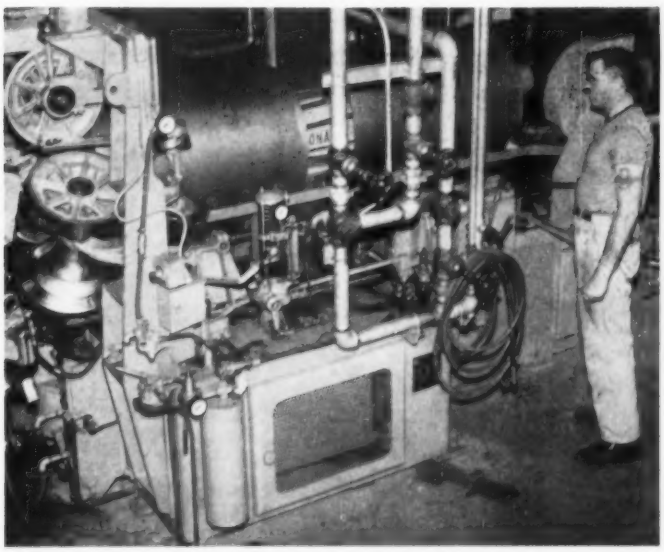
Drums along the production line



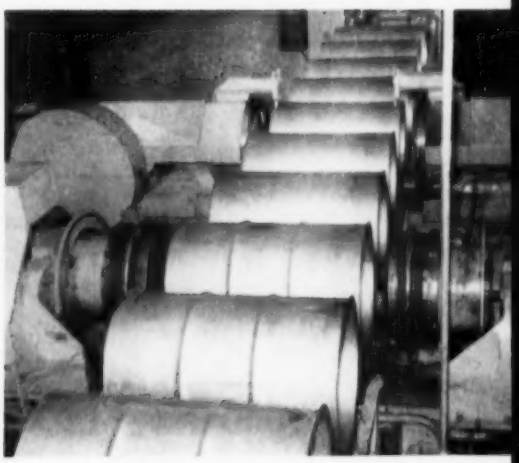
CLEAN SHEET, in 7-ton bundles, is conveyed under vacuum feeders which feed one sheet at a time to transfer conveyor that carries them through edge trim slitter. After slitting, sheets pass under vacuum blast heads for steel-shot blasting to remove dirt and scale from edges and insure sound welds, then feed automatically into welder at rear

In consumption of sheet steel—a million tons a year—the steel shipping-container industry ranks second only to the automobile industry. Its products, drums and pails, are manufactured to guard their contents against contamination and against loss by leakage or evaporation. They are dragged across concrete floors, piled high in warehouses, slammed against steel decks, and generally "treated rough" because they are made of steel and expected to "take it." And with all this, they must be produced at low cost to avoid inflating the over-all cost of the contents.

To keep costs down, and to keep pace with the increasing demand, container manufacturers have depended upon continually developing high-speed manufacturing methods and equipment. US Steel Products Div, US Steel Corp, for example, has opened a new plant in Camden, NJ, for continuous operation. Its high-speed drum line is capable of turning out 600 standard steel drums per hour; its high-speed pail line will produce 2400 steel pails per hour for paint, oils, and similar products. So completely has this plant been mechanized that, in spite of the number of operations involved, 75% of the cost of the product is represented by materials cost.

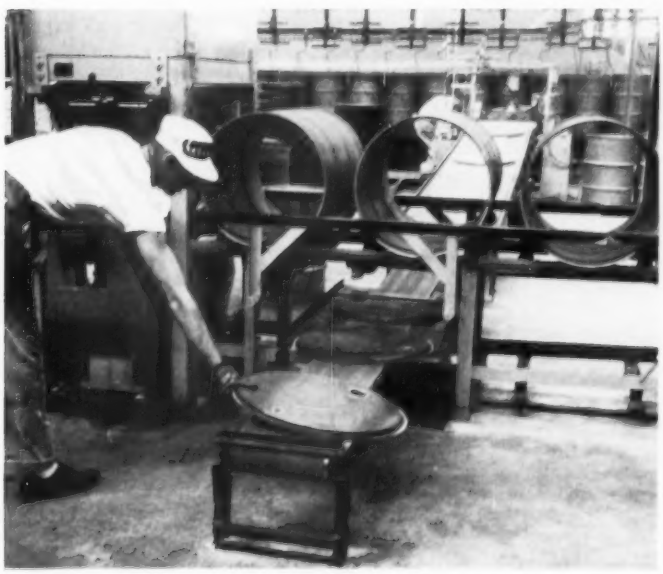


FLAT SHEETS are fed into National Automatic welder where they are rolled into cylinders and fed to the welding head. Three hourglass-type rollers hold the work to an exact diameter at the point of weld, then feed finished cylinders to a conveyor for transfer to the fabricating line

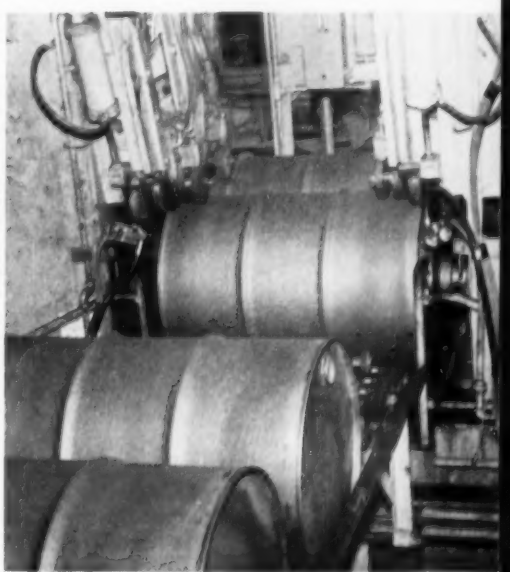


LEAVING THE WELDER, drums are turned automatically through 90° and fed, one every 6 sec, to Carando flanging machine which forms a flange on each end. They then pass to a second station where two ribs, or rolling hoops, are expanded into the body to add stiffness and rigidity

They turn them out by the million to meet an ever-growing demand from the chemical, petroleum, and paint industries. And here's how they do it at the latest, mechanized plant of US Steel Products Div

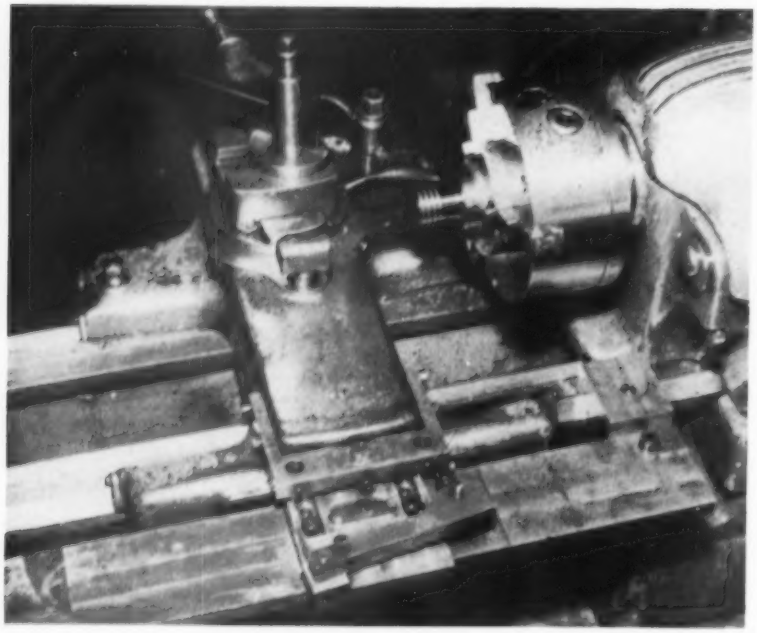


HEADS AND BOTTOMS are inserted in the drum shell, and a precurl, or partial flange, is formed on the edges. A latex sealing compound is then applied to both joints. Ends are stamped and bunghole bosses applied on a separate line, and are fed to main line by belt conveyor



DOUBLE SEAMS are formed simultaneously at both ends on Carando machine to produce five thicknesses of metal at the joint. Drums are conveyed into and out of the machine and are rotated by drive rollers at 200 rpm during the seaming process

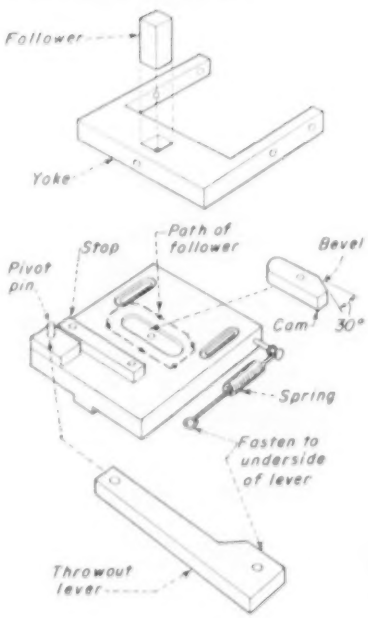
Practical Ideas . . .



Tapering, Threading Attachment Disengages Tool at Precise Point

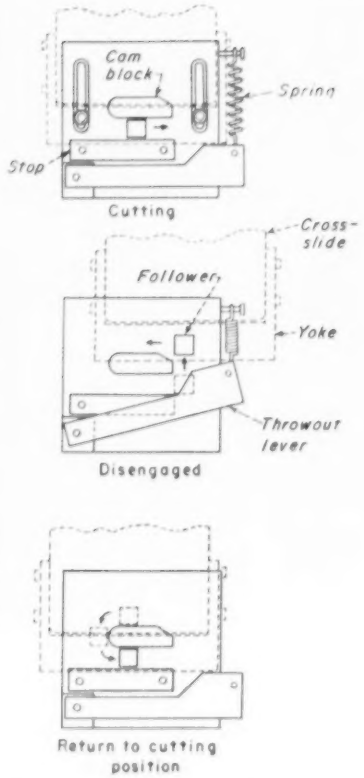
This rig on a small engine lathe insures that a thread will be cut to the same length on any number of identical parts. To use it, the regular cross-slide feed is disengaged and feed is controlled by a vertical follower block inserted through a hole in a yoke bolted to the back end of the slide.

A main plate is clamped to the rear bedways. This has a dovetailed slot that confines an auxiliary slide for back-and-forth adjustments. The slide is fitted with a stop block and a cam block between which the follower rides while a thread is being cut. When the follower comes to the end of the cam block, and clears it, a tension spring between a bolt on the auxiliary slide and the throwout lever forces the cross-slide to the front of the lathe, disengaging the tool from the work.



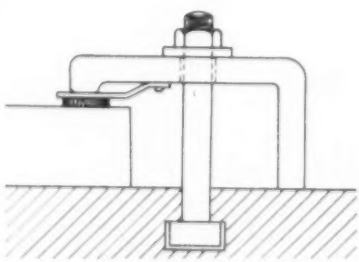
As the saddle is returned to take another cut on the work, or to cut another workpiece, a beveled edge on the cam catches the edge of the follower and forces it forward so it will go around the cam—thus preventing it from touching the work on the back stroke. When the follower clears the tailstock-end of the cam, it can be manually pushed back to fit between the stop and cam for another cut.

The same rig can be utilized for taper cuts, because the cam and stop can be arranged at any angle



required. As illustrated, the attachment will only handle a limited range of cut lengths, but this might be changed. Note that the bottom face of the follower just about touches the top face of the slide.

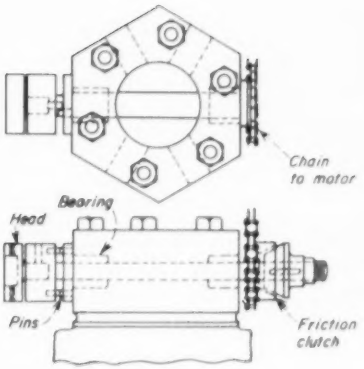
Carlos Perez G, Mexico City, Mexico



Soft Table Clamp

When you have to clamp down a workpiece that can't be marred, an ordinary clamp can be adapted by adding a small block of soft metal or non metal to contact the work. It is held under the clamp jaw by means of a piece of spring steel.

Federico Strasser, Santiago, Chile



Motorized Turret Backoff Runs Tap or Solid Die

Tapping and threading operations can be done with this device, which will work on any turret lathe with an equal number of holes and with no obstructions in the middle.

Two flanged bushings are mounted in opposite turret holes to act as bearings. Through these runs a main shaft, which has a head bored and fitted with setscrews to support the tap or solid threading die. At the rear face of the head two hardened pins are engaged by matching hardened pins sunk in the face of the front bearing. These prevent the head from rotating with the work while the thread is being cut.

At the rear position, a friction clutch is arranged to be operated as the turret ram backs up. When the turret moves back from the work, the clutch is engaged because the main shaft is held forward by the work. This disengages the two sets of hardened pins at the front, and allows the motor to rotate the main shaft to withdraw the tool. A small helical spring between clutch halves disengages the clutch when the tool comes free.

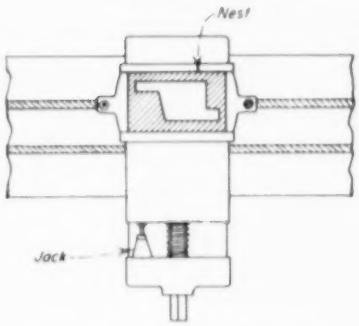
Power is from a motor mounted on top of the turret (not shown), where it is out of the way, and which can easily be taken down if not to be used. The chain drive runs free unless the clutch is engaged.

A 1/6 or ¼-hp motor is powerful enough to run the shaft at twice the lathe-spindle speed, and in the opposite direction. The motor is controlled by a footswitch, and is turned on only when the turret has the tapping rig indexed into position to work. This handles a ⅜—16 die without trouble.

V C Boydston, Tulsa, Okla

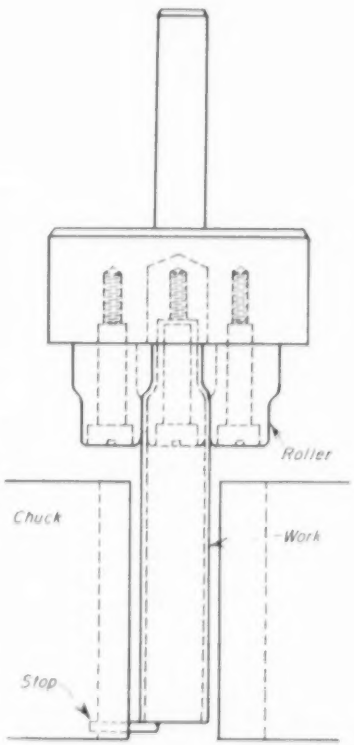
Jackscrews Prevent Accidental Vise Opening

One or two regular jackscrews, or a pair of heavy bolts and nuts, can be clamped between the live jaw and the frame of a bench vise, as illustrated. This prevents accidental opening, which might ruin a special setup where a built-up holding device is being used for an odd-shaped part.



Ofter removing the vise handle is not enough, because many complex setups have been ruined when someone forgot to leave the setup alone.

Frank La Saracina, New York, N Y



Drillpress Rolling Fixture Forms Tube Ends

This fixture fits in a drillpress spindle and forms both ends of ¾-in. copper tubing to a ¼-in. dia; each end formed for the same length. It works over a regular drillpress work chuck, which has been fitted with a stop pin to locate the tubing.

Three identical formed rollers are used, and are held by studs over which they are running fits. The tubing acts to pilot itself to center as the tool comes down.

The chuck jaws are V-notched to center the tubing as it stands vertically on the drillpress table. If some other dia is to be rolled, the same fixture can be used with new holes drilled at a different radius to carry the same studs and rollers.

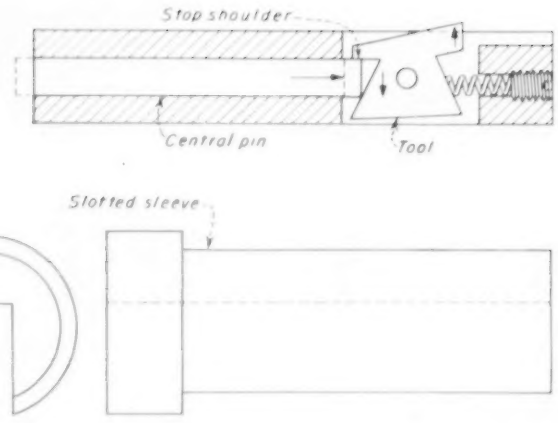
Albert H Provost, Ludlow, Mass

Double-Cutting Drill Does Faster Work

If a large or medium-size drill is ground as illustrated it will cut faster. In effect, it becomes two drills, each one taking part of the load. The smaller dia must be ground to form clearance and sharp edges. Usually the ground section can be about ¼ in. long.

Stanley Clark, E Bradenton, Fla

Disappearing Groove Tool Cuts Bronze Bushings



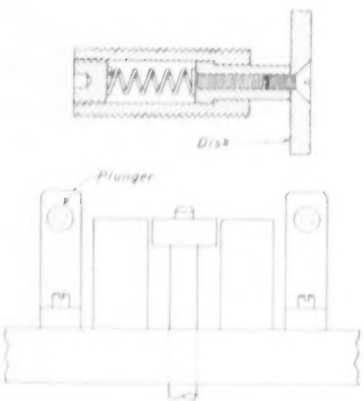
We now broach out oil grooves in a number of sizes of bronze bushings. The same tool can be used with a number of slotted sleeves, which adapt it to the work size.

The tool has such an odd shape for a good reason. As it broaches through the work, the central pin pushes the cutting tip out to a given depth—the same for all bushings. When pressure is released, the spring returns the tool to rest position, where it does not project from the tool shank. Thus, it can be lifted from the work without doing any damage.

The tool works under a hand-operated arbor press. All parts except the bit are cold-rolled steel. The bit is oil-hardening steel.

Note that the rear shoulder on the tool stops against the end of the central pin, and allows the tool to project only a certain amount. The central pin and tool shank are designed and cut so they are flush while the press forces them down.

Robert E Kiehl, Sheboygan, Wis



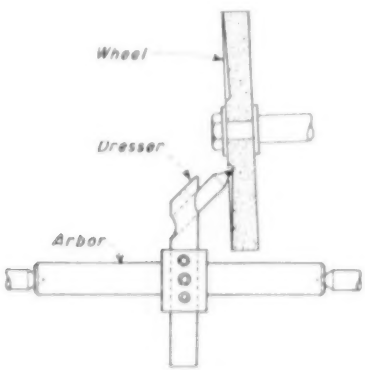
Modified Spring Plungers Gage Blanked Stock in Die

We use a number of Vlier spring-loaded plungers as side, front, and back gages for blanked stock to be formed. On dies where deep forming is to be done, as illustrated, the power-sheared stock may not be located just right because the regular spring plunger is only ⅛ in. thick; and often the stock may be laid over a plunger instead of against it.

Therefore, we have added 1-in-dia disks to the ends of the plungers. These insure that the plungers will stop the stock, and will handle their function; which is to help locate the stock despite irregularities in stock width and length.

To assemble the extra disks, we held the plungers themselves between two thin strips of metal in a vise, which allowed drilling, tapping, and adding the disk and screw.

Edward P Boehnlein, Century Electric Co, St Louis Mo



Wheel Clearance Dresser Swings on Centers

Side clearance and sharp corners may be dressed with this device, which can be swung between bench, table, or lathe centers. The wheel can be operated by any convenient means; but it is necessary that either the dresser or wheel can be fed. Normally the dresser will be swung by hand.

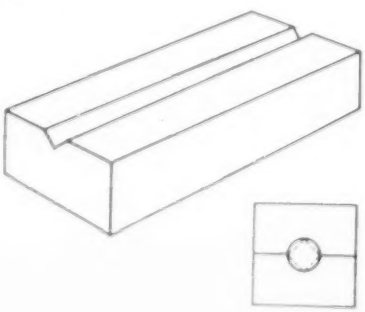
Using this tool replaces offhand clearance grinding, which is often none too accurate. The radius of the diamond from the arbor center should be chosen in relation to wheel diameter. Tilting the wheel, or the centers on which the arbor swings, determines the angle of clearance.

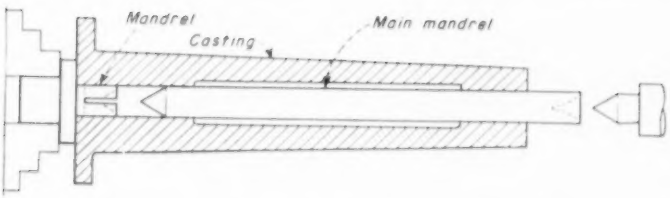
Cyril F Kolbe, Port Hudson, Mich

Drill Hole Between Split Dies

If a hole has to be drilled between the two faces of split dies, so half of the hole lies in each die face, a good way to prevent the drill from wandering is to shape a V-groove in each die half before drilling. This guides the drill, and takes much of the load away, so it goes straight and true.

Federico Strasser, Santiago, Chile





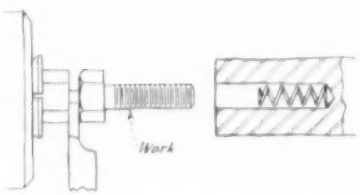
Clutch Mandrel Holds Cored Castings

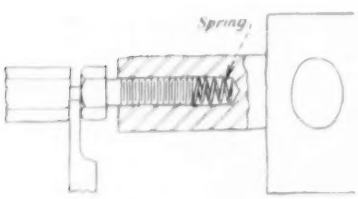
Outside surfaces of 110 cast-iron cored castings were machined on the lathe using a special mandrel that has clutch action. This was after the central hole had been drilled and reamed on a drillpress.

A short expanding mandrel was chucked. This fitted inside the workpiece hole, and was slotted so it would expand. A shoulder was also provided. The main mandrel had a pointed end to fit into the stub mandrel and by means of end pressure from the live tailstock center it opened the stub mandrel to grip the work internally. The long mandrel section was a fairly snug fit inside the work, so it centered the tail end of the work.

Each time a workpiece was loaded, the long mandrel had to be slipped into the work before loading it on the lathe, and taken out after unloading.

Brendon A Mallis, Philadelphia, Penna





Turret Work Support Helps Clean Cutoff

Making a clean cutoff with no perceptible nib left on the work is often difficult, if not impossible. Even a skew cutoff tool may not do a perfect job, and may allow premature break-off.

This turret support helps a great deal. The work is guided into a clearance hole which keeps the work in line while the cutoff tool is working. A compression spring in the bottom of the hole makes ejection easier.

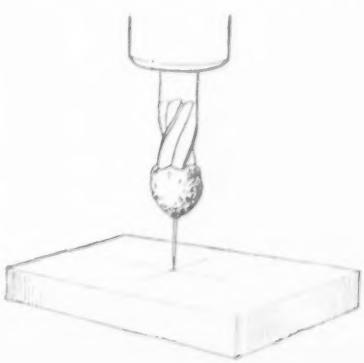
H J Gerber, Oklahoma A & M Stillwater, Okla

Clay-Needle Wiggler Aligns Cutters, Table

An ordinary sewing needle, imbedded in modeling clay, can be used on a cutter to help pick up layout lines or centerlines. The clay can be pressed into the flutes of the cutter, on the cutter side, and the needle moved so its point is running concentric with the cutter center.

Another trick with the same needle is to slap the clay on a stationary part of the machine, and adjust the needle so a line or edge of the work will run past it as the table traverses. Thus, you can check work alignment.

Gosta Wernberg, Brooklyn, N Y



Winner No. 248

FEDERICO STRASSER

Santiago, Chile

won $25 in addition to regular payment for his idea:

CUT THIN TUBING

in the issue of April 9, 1956

An extra payment of $25 is made for the best Practical Idea in each number of *American Machinist*. To avoid bias, the selection will be made by readers, a different group each time.

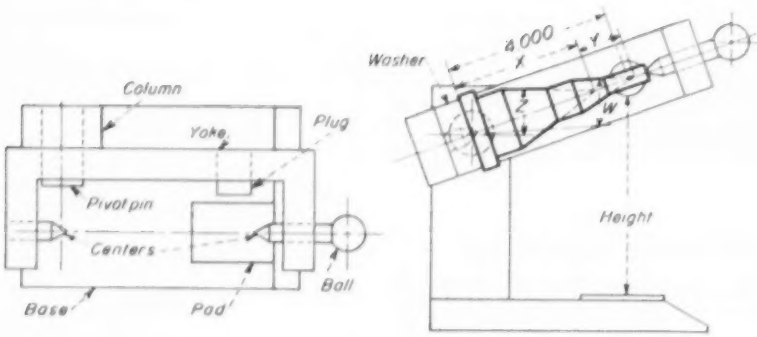
PAYMENT—$25 in addition to regular rates for the item as published, to be paid as soon as reader votes are received—usually three to four weeks after the date of issue. The winner will also be announced in these pages as soon thereafter as practicable.

JUDGES—A group of 200 *American Machinist* readers is asked to select preferred articles in each issue. The group is a true cross-section of all readers, and changes entirely each time. Their votes, in addition to guiding the editors, select the best Practical Idea. If at any time their votes result in a tie, $25 will be paid to each and every co-winner. Decision of the readers will be final in each case.

REQUIREMENTS—Only items in the Practical Ideas pages are eligible, and they must be submitted directly by the originator. Do not worry about your shortcomings as a draftsman, photographer, or author—every item will be edited in accordance with *American Machinist* standards and suitable illustrative or explanatory material added where needed. Readers will judge only the finished product—in terms of its usefulness to them.

WHO MAY ENTER—Anyone may enter except employees of the McGraw-Hill Publishing Co, Inc, and those of advertising agencies or departments. Suggest to your employees that they submit ideas.

HOW TO ENTER—Send your entry to "Practical Ideas Editor," American Machinist, 330 West 42nd St, New York 36, N Y.



Double Tapers Checked With Swinging Sine Fixture

The problem of inspecting two tapers on a single workpiece may involve finding out how far apart the apexes of the tapers are. To do this, the illustrated swinging fixture is built.

The base has a vertical column that supports a yoke by means of a pivot pin. The yoke is fitted with centers to support the work, and also with a 1-in.-dia plug out on the right end to allow angle measurements. All these parts are centered together for top accuracy.

Work is loaded between centers, but a precision washer is inserted between the left end of the yoke and the base of the part so the base will be on a centerline of the pivot pin. Then the left-hand center is adjusted to hold the work properly.

The height of the pivot-pin center is known (5 in.) and the distance from the pivot-pin center to the center of the plug is known (4 in.). In addition, a pad is welded to the base and precision ground to a 1-in. height to simplify mounting gage blocks and measuring with them.

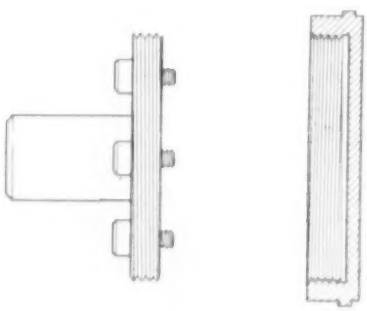
First the yoke is tilted so the top of one of the tapers is horizontal, checked with a surface gage. Gage blocks are built up under the plug to give a reading, from which you can calculate the angle of the work centerline. This gives you the taper angle.

With a fixture measuring the same as that illustrated, the plug will measure 3.5 plus 4 times sine 20°, assuming the taper angle on the work is correct. Now measure height Z, from the top of the tapered section, to the center of the pivot pin. Then calculate; x = Z sec 20°.

To find Y, tilt the yoke again to bring the top of the second tapered section horizontal, and check the angle. In the case shown, this is 15°, and can be checked by gage-blocking up from the pad. This dimension, if the taper is correct, is 3.5 plus 4 times sine 15°. Measure dimension W (which will be vertical when the top of the taper is horizontal), and find Y = W cosec 15° minus X.

Thus, you can find the distance between tapers, as well as check the taper angles themselves.

Charles Minaire, St Etienne, France



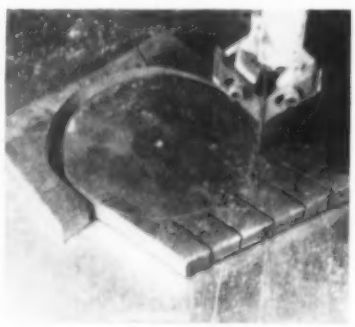
More on Mandrel For Threaded Parts

The rubber disk on a mandrel face (*AM*—Feb 13 '56, p 167) looked like an idea we could use. We tried it out, however, and found that the work was inclined to flatten out as we turned the face close to the edge.

Our substitute works better, although it takes more time to mount and take down the work. Six cap-screws are threaded into the back face of the mandrel, and are ground off evenly to support the back of the dish-shaped workpiece. Work is threaded on easily, then turned and faced. To get the work off, we back up the screws slightly, and unthread the work.

Finally, before putting on a new piece, we retighten the screws to bring them back out to full depth. They should be snug, not jammed.

Clifford Malloy, Bronx, N Y



Bandsaw Cuts Smaller Circle With Radiating Cuts

Illustrated is a method of getting under the normal circle size a bandsaw can cut. This allows using a thicker blade, with more strength, to prevent overloading and breakage.

The radiating saw cuts should not touch the layout line, but end about 1/16 in. from it. The scrap material will unwrap as you cut, allowing clearance for the blade to cut a fairly tight circle. In addition, if the radiating cuts are intersected by the circular cut, the blade will tend to wander and make an uneven curve.

If it is necessary to use a thicker blade for a circular cut than should theoretically be able to make the curve, this method will make it possible.

H J Gerber, Oklahoma A & M, Stillwater, Okla

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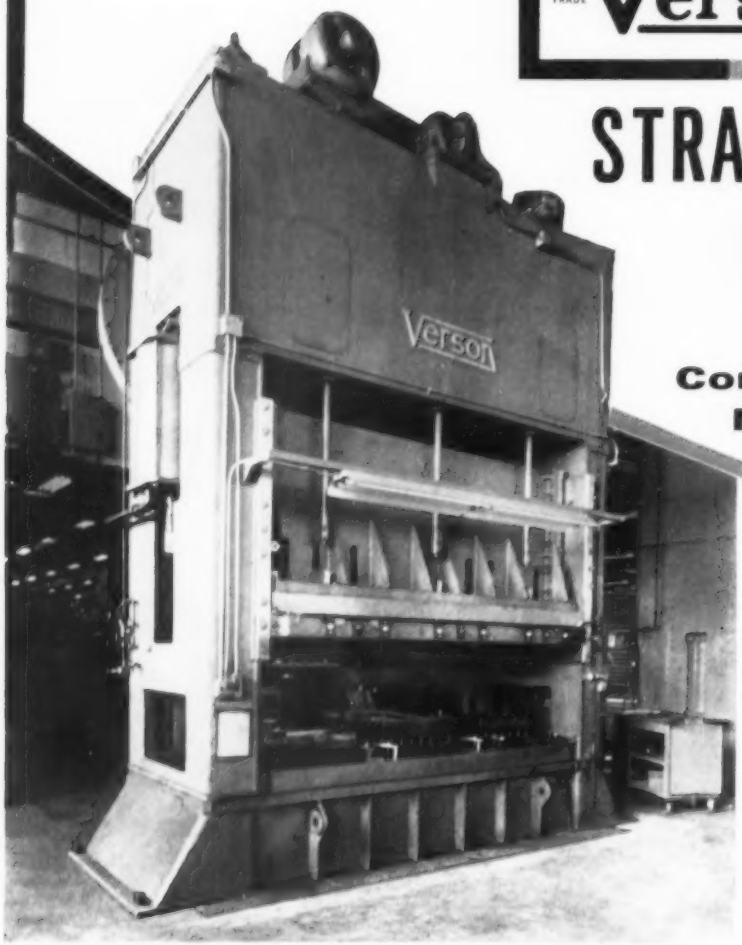

400 ton Verson Allsteel double crank, single action press used for a variety of large area stampings at Northern Metal Products Co., Franklin Park, Illinois. Bolster area of the press front to back, right to left, is 60" by 120".

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Speeds for Mounted Wheels . . . IV

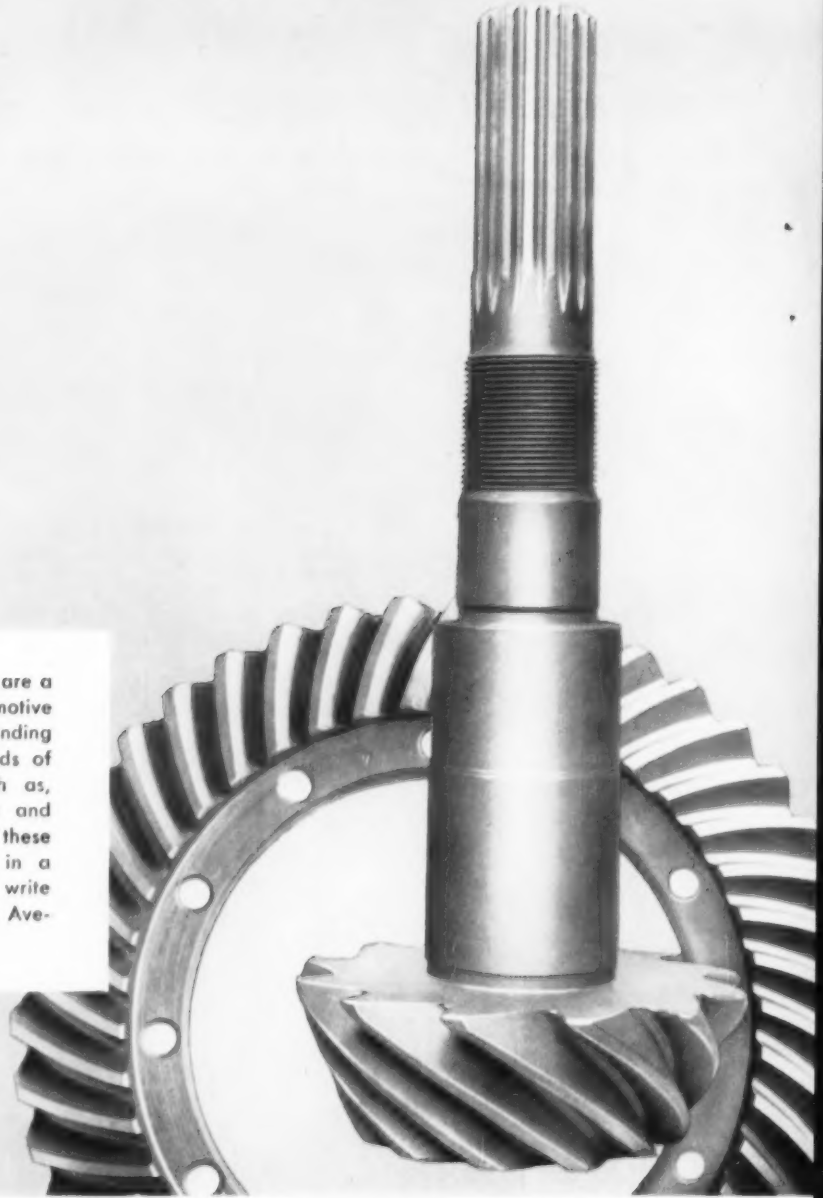
Maximum Safe Operating Rpm for "B" Wheels

Shape No.	Shape Size Dia	Shape Size Thickness	Overhang—Dimension O—In. ⅛†	1	1½	2	2½
			⅛-IN. MANDRELS				
B 41	5/16	5/16	33,750	23,250	17,620	13,650	10,350
B 42	1/2	1/4	33,750	23,250	17,620	13,650	10,350
B 43	1/4	1/16	81,370	51,000	34,120	24,000	16,870
B 44	1/10	1/8	68,400	42,370	28,870	20,850	15,000
B 45	1/16	1/16	104,250	61,870	44,620	30,900	20,250
B 46	1/8	1/16	105,000	64,500	46,650	32,400	21,370
B 47	1/8	1/32	105,000	64,500	46,650	32,400	21,370
B 51	1/10	1/4	45,370	28,500	21,000	15,900	12,150
B 52	1/8	1/4	45,370	28,500	21,000	15,900	12,150
B 53	1/4	3/8	60,000	38,020	26,250	18,750	13,870
B 54	1/4	1/2	60,000	38,020	26,250	18,750	13,870
B 55	1/8	1/4	105,000	64,500	46,650	32,400	21,370
B 61	3/4	1/16	38,250	24,370	17,400	13,270	9,970
B 62	1/2	1/4	41,020	26,400	19,500	15,000	11,400
B 63	1/4	1/16	92,400	57,370	39,370	27,900	18,900
B 64	1/4	1/16	105,000	64,500	46,650	32,400	21,370
B 65	1/8	1/4	105,000	64,500	46,650	32,400	21,370
B 70	3/4	1/32	50,930	41,250	27,750	20,400	15,000
B 71	3/4	1/32	61,120	48,000	31,500	22,650	16,870
B 72	1/2	1/32	73,500	43,650	29,100	20,770	15,450
B 73	1/2	1/32	73,500	43,650	29,100	20,770	15,450
B 74	1/10	1/16	105,000	64,500	46,650	32,400	21,370
B 81	3/4	1/16	50,930	41,250	27,750	20,400	15,000
B 82	1/2	1/4	76,390	51,000	34,120	24,000	16,870
B 83	1/8	1/8	82,600	53,250	35,250	24,750	17,250
B 84	1/16	1/16	105,000	64,500	46,650	32,400	21,370
B 90	1/2	1/2					
B 91	1/2	1/4	34,500	22,500	16,870	13,120	9,900
B 92	1/4	1/4	81,370	51,000	34,120	24,000	16,870
B 93	1/16	1/16	105,000	64,500	46,650	32,400	21,370
B 94	11/64	1/32	105,000	64,500	46,650	32,400	21,370
B 95	1/8	1/16	105,000	64,500	46,650	32,400	21,370
B 96	1/8	1/4	105,000	64,500	46,650	32,400	21,370
B 97	1/8	1/8	105,000	64,500	46,650	32,400	21,370
B 98	1/32	1/4	105,000	64,500	46,650	32,400	21,370
B 101	1/8	11/16	33,750	23,250	17,620	13,650	10,350
B 102	1/8	1/2	45,370	28,500	21,000	15,900	12,150
B 103	1/8	1/16	61,120	41,250	27,750	20,400	15,000
B 104	1/16	1/8	68,400	42,370	28,870	20,850	15,000
B 105	1/4	1/4	104,250	61,870	44,620	30,900	20,250
B 106	1/8	1/64	105,000	64,500	46,650	32,400	21,370
B 111	1/16	11/16	33,750	23,250	17,620	13,650	10,350
B 112	3/8	1/2	45,370	28,500	21,000	15,900	12,150
B 113	1/4	1/4	81,370	51,000	34,120	24,000	16,870
B 114	1/10	1/8	68,400	42,370	28,870	20,850	15,000
B 115	1/10	1/8	105,000	64,500	46,650	32,400	21,370
B 121	1/2	1/2	45,370	28,500	21,000	15,900	12,150
B 122	3/8	3/8	61,650	37,720	27,000	19,870	14,250
B 123	1/16	1/16	104,250	61,820	44,620	30,900	20,250
B 124	1/4	1/4	105,000	64,500	46,650	32,400	21,370
B 131	1/2	1/2	34,500	22,500	16,870	13,120	9,900
B 132	3/4	1/2	45,370	28,500	21,000	15,900	12,150
B 133	3/4	3/4	54,000	33,000	24,150	18,000	13,500
B 134	1/16	3/4	61,650	37,720	27,000	19,870	14,250
B 135	1/4	1/2	60,000	38,020	26,250	18,750	13,870
B 136	1/4	1/16	77,250	45,920	30,900	22,500	16,120

Shape No.	Overhang—Dimension O—In. ⅛†	1	1½	2	2½
	1/10-IN. MANDRELS				
B 43	67,500	41,250	27,000	18,750	12,750
B 44	57,000	34,500	22,500	16,500	11,250
B 45	86,250	50,250	35,250	24,000	15,000
B 46	87,000	52,500	36,750	24,750	16,500
B 47	87,000	52,500	36,750	24,750	16,500
B 53	49,500	30,750	20,250	14,250	10,500
B 55	87,000	52,500	36,750	24,750	16,500
B 63	76,500	46,500	30,750	21,750	14,250
B 64	87,000	52,500	36,750	24,750	16,500
B 65	87,000	52,500	36,750	24,750	16,500
B 70	50,930	33,750	21,750	15,750	11,250
B 71	61,120	39,000	24,750	17,250	12,750
B 72	60,750	35,250	23,250	16,500	12,000
B 73	60,750	35,250	23,250	16,500	12,000
B 74	87,000	52,500	36,750	24,750	16,500
B 81	50,930	33,750	21,750	15,750	11,250
B 82	67,500	41,250	27,000	18,750	12,750
B 83	72,750	43,500	27,750	19,500	12,750
B 84	87,000	52,500	36,750	24,750	16,500
B 92	67,500	41,250	27,000	18,750	12,750
B 93	87,000	52,500	36,750	24,750	16,500
B 94	87,000	52,500	36,750	24,750	16,500
B 95	87,000	52,500	36,750	24,750	16,500
B 96	87,000	52,500	36,750	24,750	16,500
B 97	87,000	52,500	36,750	24,750	16,500
B 98	87,000	52,500	36,750	24,750	16,500
B 104	57,000	34,500	22,500	16,500	11,250
B 105	61,120	50,250	35,250	24,000	15,000
B 106	87,000	52,500	36,750	24,750	16,500
B 112	37,500	23,250	16,500	12,750	9,000
B 113	67,500	41,250	27,000	18,750	12,750
B 114	57,000	34,500	22,500	16,500	11,250
B 115	87,000	52,500	36,750	24,750	16,500
B 122	51,000	30,750	21,000	15,000	10,500
B 123	86,250	50,250	35,250	24,000	15,000
B 124	87,000	52,500	36,750	24,750	16,500
	¼-IN. MANDRELS				
B 41	61,120	46,500	35,250	27,370	21,000
B 42	61,120	46,500	35,250	27,370	21,000
B 51	81,000	54,370	42,000	33,000	25,500
B 52	81,000	54,370	42,000	33,000	25,500
B 61	50,930	50,930	38,100	29,020	22,500
B 62	71,250	47,620	35,020	27,000	20,850
B 71	61,120	61,120	48,000	37,500	29,020
B 72	76,390	62,400	45,750	35,400	27,520
B 73	76,390	62,400	45,750	35,400	27,520
B 91	61,500	42,000	31,500	24,000	18,370
B 101	61,120	46,500	35,250	27,370	21,000
B 102	61,120	54,370	42,000	33,000	25,500
B 111	66,000	46,500	35,250	27,370	21,000
B 112	81,000	54,370	42,000	33,000	25,500
B 121	76,390	54,370	42,000	33,000	25,500
B 131	61,500	42,000	31,500	24,000	18,370
B 132	81,000	54,370	42,000	33,000	25,500

†Also for threaded mandrels

"IT'S BETTER IF IT CONTAINS MOLY"



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CLIMAX MOLYBDENUM

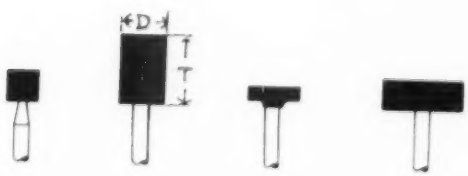
Speeds for Mounted Wheels . . . V

Maximum Safe Operating Rpm for "W" Wheels

Shape No.	Dia	Thickness	Overhang—Dimension O-In.				
			½†	1	1½	2	2½
			3/32-IN. MANDRELS				
W 141	3/32	3/32	93,750	53,250	37,500	25,500	16,500
W 142	3/32	1/16	93,750	53,250	37,500	25,500	16,500
W 143	1/16	1/16	93,750	53,250	37,500	25,500	16,500
W 144	1/16	1/8	93,750	53,250	37,500	25,500	16,500
W 145	1/8	3/16	88,500	49,500	35,250	24,000	15,750
W 146	1/8	1/2	81,000	45,750	31,500	22,500	15,000
W 147	3/32	1/32	93,750	53,250	37,500	25,500	16,500
W 148	3/32	1/16	93,750	53,250	37,500	25,500	16,500
W 149	3/32	1/8	90,750	50,250	36,000	24,750	15,750
W 150	1/16	1/16	93,750	53,250	37,500	25,500	16,500
W 151	1/16	1/8	93,750	53,250	37,500	25,500	16,500
W 152	1/16	1/8	83,250	47,250	33,000	23,250	15,000
W 153	1/16	3/16	73,500	42,000	28,500	21,000	13,500
W 154	1/16	1/2	66,000	38,250	25,500	18,750	12,750
W 155	11/64	1/8	78,000	44,250	30,750	21,750	14,250
W 156	1/8	1/32	93,750	53,250	37,500	25,500	16,500
W 157	1/8	1/16	93,750	53,250	37,500	25,500	16,500
W 158	1/8	1/8	93,750	53,250	37,500	25,500	16,500
W 159	1/8	1/16	78,000	44,250	30,750	21,750	14,250
W 160	1/8	1/8	69,000	42,000	27,750	18,750	13,500
W 161	1/8	3/16	66,000	39,750	24,750	17,250	12,750
W 162	1/8	1/4	57,000	34,500	23,250	16,500	11,250
W 165	5/32	1/16	93,000	51,750	37,500	25,500	16,500
W 166	5/32	1/8	84,750	48,750	28,500	19,500	14,250
W 167	5/32	1/8	61,500	39,000	24,750	18,000	12,000
W 168	5/32	3/16	56,250	33,750	22,500	16,500	12,000
W 169	5/32	1/4	48,000	28,500	20,250	15,000	11,250
W 170	5/32	1/2	39,750	26,250	16,500	12,750	9,750
W 171	5/32	3/4	27,750	19,500	13,500	10,500	8,250
W 172	3/16	1/16	85,500	48,750	33,750	24,000	15,000
W 173	3/16	1/8	71,250	46,500	30,000	19,500	12,750
W 174	3/16	1/4	54,000	32,250	21,000	15,000	10,500
W 175	3/16	3/8	41,250	24,000	18,000	12,750	9,750
W 176	3/16	1/2	33,750	21,000	15,750	12,000	9,000

Shape No.	Dia	Thickness	Overhang—Dimension O-In.				
			½†	1	1½	2	2½
			¼-IN. MANDRELS				
W 143	1/8	1/8	105,000	64,500	46,650	32,400	21,370
W 144	1/8	1/4	105,000	64,500	46,650	32,400	21,370
W 145	1/8	3/8	105,000	64,500	46,650	32,400	21,370
W 146	1/8	1/2	105,000	64,500	46,650	32,400	21,370
W 151	3/16	1/8	105,000	64,500	46,650	32,400	21,370
W 152	3/16	1/4	105,000	64,500	46,650	32,400	21,370
W 153	3/16	3/8	80,850	52,500	37,500	26,250	17,620
W 154	3/16	1/2	70,500	45,600	31,500	21,970	15,220
W 157	1/4	1/16	123,000	65,625	47,770	33,150	21,750
W 158	1/4	1/8	105,000	64,500	46,650	32,400	21,370
W 159	1/4	3/16	92,400	57,370	39,370	27,900	18,900
W 160	1/4	1/4	81,370	51,000	34,120	24,000	16,870
W 161	1/4	5/16	77,250	45,970	30,900	22,500	16,120
W 162	1/4	3/8	68,400	42,370	28,870	20,850	15,000
W 163	1/4	1/2	60,000	38,020	26,250	18,750	13,870
W 164	1/4	5/8	45,900	30,000	21,750	15,900	11,850
W 165	5/16	1/16	107,400	62,470	41,250	29,250	20,250
W 166	5/16	1/8	96,970	57,000	35,620	25,120	18,000
W 167	5/16	1/4	75,000	45,750	31,120	22,500	15,750
W 168	5/16	5/16	68,400	41,770	28,650	21,000	15,000
W 169	5/16	3/8	61,650	37,720	27,000	19,870	14,250
W 170	5/16	1/2	52,500	33,000	23,020	16,650	12,600
W 171	5/16	3/4	37,120	25,500	18,750	14,620	10,020
W 172	3/8	1/16	99,370	59,250	41,020	29,250	20,250
W 173	3/8	1/8	87,600	53,250	35,250	24,750	17,250
W 174	3/8	1/4	69,000	41,250	27,750	20,400	15,000
W 175	3/8	3/8	54,000	33,000	24,150	18,000	13,500
W 176	3/8	1/2	45,370	28,500	21,000	15,900	12,150
W 177	3/8	3/4	33,750	23,250	17,620	13,650	10,350
W 178	3/8	1	26,250	18,750	14,250	10,870	8,250
W 181	1/2	1/16	76,390	55,500	36,750	25,500	17,850
W 182	1/2	1/8	73,500	43,650	29,100	20,770	15,450
W 183	1/2	1/4	51,750	31,870	22,500	17,250	12,900
W 184	1/2	3/8	41,020	26,400	19,500	15,000	11,400
W 185	1/2	1/2	34,500	22,500	16,870	13,120	9,900
W 186	1/2	3/4	26,250	17,400	12,750	9,750	8,020
W 187	1/2	1	20,620	13,870	10,120	7,870	6,370
W 190	5/8	1/16	61,120	48,000	31,500	22,650	16,870
W 191	5/8	1/8	58,870	34,500	25,120	18,900	14,250
W 192	5/8	1/4	43,120	27,370	19,870	15,220	11,620
W 193	5/8	3/8	32,250	23,020	16,500	12,520	9,750
W 194	5/8	1/2	29,400	19,120	13,500	10,500	8,250
W 195	5/8	3/4	22,120	14,250	10,120	7,650	6,150
W 196	5/8	1	17,620	11,620	8,100	6,150	5,100
W 199	3/4	1/16	50,930	44,770	30,000	21,750	15,750
W 200	3/4	1/8	50,930	33,520	23,850	17,850	13,350
W 201	3/4	1/4	38,250	24,370	17,400	13,270	9,970
W 202	3/4	3/8	30,600	19,500	13,500	10,120	7,800
W 203	3/4	1/2	25,500	15,900	10,870	8,250	6,600
W 204	3/4	3/4	18,900	12,000	8,400	6,220	5,250
W 210	7/8	1/16	43,650	35,250	25,720	18,900	14,320
W 211	7/8	1/8	43,650	27,900	20,400	15,820	12,270
W 212	7/8	1/4	33,750	20,400	14,400	11,020	9,000
W 213	7/8	1/2	27,000	16,870	11,250	8,250	6,600
W 215	1	1/16	38,200	24,900	18,000	13,870	10,500
W 216	1	1/8	30,520	18,600	12,750	9,520	7,500

†Also for threaded mandrels



The Frank G. Hough Co., Libertyville, Ill., manufactures "Payloader" tractor-shovels and towing tractors in three types: front-wheel-drive, rear-wheel-drive and four-wheel-drive.

ARISTOLOY STEELS

"Payloader" Parts Produce Production Profit

...When Made From a COPPERWELD LEADED ALLOY

This complex gear assembly is made in six separate operations, or set-ups, with a tooling sequence of 13 machining operations. When the manufacturer switched from unleaded to Copperweld leaded 8620, the faster feeds and speeds gave them a production increase of better than 25%. For example, the surface feet per minute in a finish bore operation increased from 200 SFM to 300 SFM. In addition, tool life increased 60%. Copperweld Leaded Steel, the steel with "built-in productivity" produced profit in this "Payloader" part.

For further details, write for free booklet, "Lead Treated Steels"

COPPERWELD STEEL COMPANY • STEEL DIVISION • WARREN, OHIO
EXPORT: Copperweld Steel International Co., 225 Broadway, New York 7, N. Y.

Speeds for Mounted Wheels . . . VI

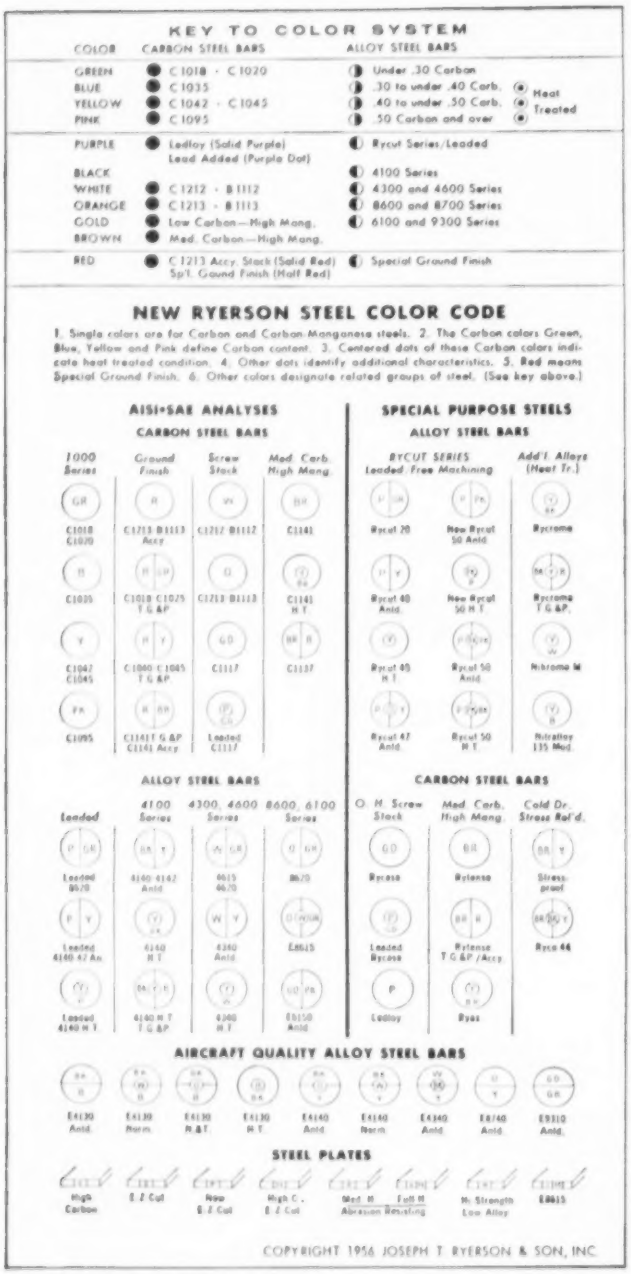
Maximum Safe Operating Rpm for "W" Wheels—Continued

Shape No.	Dia	Thickness	Overhang—Dimension O-In. ½†	1	1½	2	2½
			3/16-IN. MANDRELS				
W 158	1/4	1/8	121,500	66,750	48,000	36,000	26,250
W 159	1/4	5/16	112,500	63,000	47,250	34,650	25,120
W 160	1/3	1/8	103,500	60,000	44,250	33,000	24,000
W 161	1/4	5/16	93,750	58,120	42,750	31,870	22,500
W 162	1/4	3/8	89,250	56,250	41,250	30,000	21,750
W 163	1/4	1/2	78,750	52,500	39,000	28,870	20,620
W 164	1/4	3/4	62,250	39,750	30,000	23,250	16,500
W 166	5/16	1/8	118,500	65,250	47,250	35,250	25,500
W 167	5/16	1/4	100,500	58,500	43,500	32,620	23,250
W 168	5/16	5/16	93,000	57,000	42,000	30,750	22,120
W 169	5/16	3/8	87,370	55,350	40,870	28,880	21,000
W 170	5/16	1/2	76,500	47,250	34,500	25,500	18,750
W 171	5/16	3/4	57,000	37,500	27,750	21,750	15,750
W 173	3/8	1/8	101,900	65,250	46,500	34,500	24,740
W 174	3/8	1/4	98,850	57,750	42,750	32,250	23,250
W 175	3/8	3/8	81,750	50,620	36,750	27,750	20,250
W 176	3/8	1/2	66,750	43,120	31,350	23,620	17,400
W 177	3/8	3/4	54,000	36,000	26,250	20,250	15,000
W 178	3/8	1	42,000	29,250	22,500	17,250	12,900
W 182	1/2	1/8	76,390	56,250	39,870	29,250	21,750
W 183	1/2	1/4	75,000	47,400	33,370	24,900	18,750
W 184	1/2	3/8	57,750	39,750	29,250	21,750	15,750
W 185	1/2	1/2	49,870	33,750	25,500	19,500	14,620
W 186	1/2	3/4	39,000	28,120	21,370	15,750	12,000
W 187	1/2	1	32,350	23,250	18,370	13,500	10,500
W 188	1/2	1 1/2	22,870	17,620	13,870	11,250	
W 189	1/2	2	17,250	13,500	10,500	8,620	
W 191	5/8	1/8	61,120	51,370	36,370	27,000	20,250
W 192	5/8	1/4	61,120	43,500	30,750	23,400	18,000
W 193	5/8	3/8	52,500	34,870	25,500	18,750	15,000
W 194	5/8	1/2	44,400	31,120	23,400	18,000	13,500
W 195	5/8	3/4	34,500	24,000	18,370	14,250	10,500
W 196	5/8	1	25,870	18,900	15,000	11,620	9,370
W 197	5/8	2	14,770	11,770	8,700	7,270	
W 200	3/4	1/8	50,930	48,750	33,750	25,500	19,500
W 201	3/4	1/4	50,930	37,500	27,900	21,370	16,500
W 202	3/4	3/8	45,750	31,500	24,370	18,000	13,870
W 203	3/4	1/2	39,750	27,370	20,620	15,900	12,000
W 204	3/4	3/4	29,250	20,250	15,000	12,000	9,370
W 205	3/4	1	24,750	17,250	12,750	10,500	8,620
W 206	3/4	1 1/4	19,500	14,250	11,620	9,000	6,750
W 207	3/4	1 1/2	16,500	12,370	9,750	7,870	
W 208	3/4	2	12,750	9,370	7,500	6,000	
W 211	7/8	1/4	43,650	43,650	31,870	24,000	18,370
W 212	7/8	1/4	43,650	34,500	25,870	19,870	14,620
W 213	7/8	3/8	42,370	28,120	21,370	16,500	12,370
W 215	1	1/4	38,200	38,200	31,130	23,620	18,000
W 216	1	1/4	38,200	33,750	24,750	19,120	14,250
W 217	1	3/8	38,200	27,000	19,870	15,750	12,000
W 218	1	1/2	32,770	22,120	16,870	12,900	10,350
W 219	1	3/4	25,120	17,620	12,900	9,900	8,400
W 220	1	1	19,500	14,250	12,250	8,620	7,120
W 221	1	1 1/2	13,120	9,370	7,120	6,000	
W 222	1	2	9,000	7,120	5,620	4,870	
W 225	1 1/4	1/4	30,560	28,970	21,220	16,270	12,300
W 226	1 1/4	3/4	30,560	22,120	16,350	12,750	10,270
W 227	1 1/4	1/2	27,750	19,120	13,950	10,650	8,700
W 228	1 1/4	3/4	20,620	14,620	11,020	8,770	7,120
W 229	1 1/4	1	16,500	12,000	8,620	6,900	5,770
W 230	1 1/4	1 1/4	13,270	9,150	6,970	5,700	
W 231	1 1/4	1 1/2	10,270	7,270	6,000	5,100	
W 232	1 1/4	2	7,500	6,000	4,870	4,500	
W 235	1 1/2	1/4	25,470	24,900	18,900	15,150	11,770
W 236	1 1/2	1/2	25,470	18,750	13,870	10,500	8,620
W 237	1 1/2	1	15,750	11,250	7,870	6,370	5,620
W 238	1 1/2	1 1/2	9,900	6,970	5,470	4,870	

Shape No.	Dia	Thickness	Overhang—Dimension O-In. ½†	1	1½	2	2½
			¼-IN. MANDRELS				
W 176	3/8	1/2	81,000	54,370	42,000	33,000	25,500
W 177	3/8	3/4	66,000	46,500	32,250	27,370	21,000
W 178	3/8	1	55,200	40,500	30,000	23,250	17,250
W 179	3/8	1 1/4	45,750	33,750	25,720	19,720	
W 182	1/2	1/8	76,390	62,400	45,750	35,400	27,520
W 183	1/2	1/4	76,390	54,750	40,500	31,120	24,000
W 184	1/2	3/8	71,250	47,620	35,020	27,000	20,850
W 185	1/2	1/2	61,500	42,000	31,500	24,000	18,370
W 186	1/2	3/4	51,000	36,370	27,750	21,220	16,120
W 187	1/2	1	40,500	30,000	24,000	18,750	14,250
W 188	1/2	1 1/2	30,370	24,000	18,900	15,000	
W 189	1/2	2	24,000	18,750	15,000	12,150	
W 190	5/8	1/8	61,120	61,120	48,000	37,500	29,020
W 191	5/8	1/4	61,120	60,000	44,250	34,500	27,000
W 192	5/8	1/4	61,120	51,750	38,400	29,770	23,250
W 193	5/8	1/2	61,120	45,000	33,370	25,870	20,100
W 194	5/8	1/2	56,400	39,750	29,400	22,720	17,400
W 195	5/8	3/4	46,500	32,400	24,900	19,720	15,370
W 196	5/8	1	35,250	27,000	21,300	16,870	13,120
W 197	5/8	2	21,000	16,500	12,900	10,870	
W 198	5/8	2 1/2	16,500	12,900	10,870		
W 201	3/4	1/4	50,930	50,930	38,100	29,020	22,500
W 202	3/4	3/8	50,930	44,100	32,400	25,120	19,350
W 203	3/4	1/2	50,930	36,370	27,750	21,750	16,870
W 204	3/4	3/4	42,750	30,750	23,250	18,000	14,020
W 205	3/4	1	34,500	25,870	19,500	15,000	12,000
W 206	3/4	1 1/4	28,720	21,520	17,020	13,500	
W 207	3/4	1 1/2	24,000	18,520	14,620	12,000	
W 208	3/4	2	18,750	15,370	12,000	9,900	
W 209	3/4	2 1/2	15,000	12,150	10,500		
W 211	7/8	1/2	43,650	43,650	42,900	33,000	26,250
W 212	7/8	1/4	43,650	43,650	35,100	27,600	21,370
W 213	7/8	1/4	43,650	40,870	29,400	23,400	18,370
W 215	1	1/8	38,200	38,200	38,200	33,750	25,500
W 216	1	1/4	38,200	38,200	33,750	26,250	20,250
W 217	1	1/4	38,200	38,200	28,500	22,500	17,400
W 218	1	1/2	38,200	32,770	24,900	19,500	14,850
W 219	1	1/4	35,100	24,520	18,750	15,000	12,000
W 220	1	1	25,500	19,120	15,750	12,370	10,500
W 221	1	1 1/2	19,120	14,620	12,000	10,500	
W 222	1	2	15,900	12,370	9,750	8,620	
W 223	1	2 1/2	12,370	9,900	8,620		
W 225	1 1/4	1/4	30,560	30,560	30,560	24,000	18,750
W 226	1 1/4	3/4	30,560	30,560	26,250	20,100	15,750
W 227	1 1/4	1/2	30,560	29,620	22,650	18,000	14,100
W 228	1 1/4	3/4	30,520	22,500	17,850	14,250	11,400
W 229	1 1/4	1	24,000	18,750	15,370	12,000	9,900
W 230	1 1/4	1 1/4	20,400	15,900	12,750	10,500	
W 231	1 1/4	1 1/2	17,620	13,500	10,650	9,000	
W 232	1 1/4	2	14,250	10,650	9,000	7,500	
W 235	1 1/2	1/4	25,470	25,470	25,470	22,720	17,620
W 236	1 1/2	1/2	25,470	25,470	21,750	17,250	13,650
W 237	1 1/2	1	22,500	17,620	13,270	10,870	9,520
W 238	1 1/2	1 1/2	15,600	12,000	9,750	8,250	

†Also for threaded mandrels

NEW COLOR CODE for steel identification



KEY TO COLOR SYMBOLS:

A—ALUMINUM BK—BLACK GD—GOLD O—ORANGE PK—PINK W—WHITE
B—BLUE BR—BROWN GR—GREEN P—PURPLE R—RED Y—YELLOW

For Stainless steels and other products, see your Ryerson Stock List

More logical system aids quality control

Accurate identification of steel—always a point of paramount importance with Ryerson—now becomes even more meaningful than before with the introduction of a new system of color marking.

Based on logical groupings of related types of steel, this new Ryerson color code is easy to understand, remember, and use. It strengthens still further the rigid program of quality control that for years has guarded the known high uniform quality of Ryerson Certified Steel.

Here's how the system works:

1. Single colors are used for standard Carbon and Carbon Manganese Steels.
2. The colors GREEN, BLUE, YELLOW AND PINK always define Carbon content.
3. Centered dots of these Carbon colors always indicate the heat treated condition.
4. Centered dots of other than Carbon colors identify characteristics other than analysis, carbon content or the heat treated condition.
5. PURPLE, BLACK, WHITE, ORANGE, GOLD and BROWN each designate a related group of steels.
6. RED marking of any kind always indicates Special Ground Finish.

If you do not already have this new steel identification chart, we will be glad to send a copy (printed in full color) for your Ryerson Stock List. Call or write your nearby Ryerson plant, or write Box 8000-A, Chicago 80, Illinois.

RYERSON

JOSEPH T. RYERSON & SON, INC.

PLANTS AT: NEW YORK · BOSTON · WALLINGFORD, CONN. PHILADELPHIA · CHARLOTTE, N. C. · CINCINNATI · CLEVELAND DETROIT · PITTSBURGH · BUFFALO · CHICAGO · MILWAUKEE ST. LOUIS · LOS ANGELES · SAN FRANCISCO · SPOKANE · SEATTLE

Talking Shop . . .

New Jewel Bottle

FRANKFORD ARSENAL has awarded a contract for pilot production of jewel bearings to Elgin National Watch Company, on machinery developed during the past six years. Some 26 machines replace hand operations that make these jewels a bottleneck in national emergency because they can be imported from Switzerland at far less than U S costs. During WW II, need was so great that bearings were smuggled out of Switzerland in the pouches of diplomatic couriers, and American production during the war of 12 million bearings was only a fraction of the need. Actually, such bearings became so tight that daily production was rushed to instrument plants. Many more would now be needed under the same conditions because of increased instrumentation. Stockpiling is no answer because of changes in size and shape with redesign of instruments.

Stud Corn

CORN SHELLERS made by C O Bartlett & Snow, Cleveland, now have end-welded studs instead of square upset rivets as teeth on cylinders. Result: output up 200%, cost down 50%. The studs are flux-filled Nelson designs, hardened (which rivets could not be). A new pattern permits fewer to be used, with greater efficiency. Thus a 50-year-old design is changed. Some 44 studs replace 160 rivets in the small machine, 90 studs replace 322 rivets in the larger. Snow engineers designed a semi-automatic positioner for use with a Nelson pneumatically operated stud welder, so studs can be welded on at a rate of one every 5 sec, including loading. The gun is advanced, and the cylinder rotated either $\frac{1}{8}$ or $\frac{1}{4}$ turn between shots. Studs are $\frac{1}{2}$ in. dia by $\frac{7}{8}$ or $1\frac{5}{8}$ in. long, the two sizes being picked off a preloaded rack with two colors of holes to avoid mis-selection. Welding cost is about 50% of riveting.

Foremen Studied

A RECENT STUDY by National Management Assn among foremen and higher executives, indicates these faults in handling foremen: inadequate training, poor selection and placement, failure to spell out what is expected, lack of follow-up (counseling and evaluating performance), poor communications (particularly on policy decisions), inadequate incentives. Foremen caused their own failures by: inability to handle personal-relations problems, personal shortcomings (lack of initiative and emotional stability), lack of management attitude and understanding, unwillingness to spend leisure time on self-development, inability to plan and organize work, failure to adjust to changing conditions. Stability of temperament seems to be the most vital factor, according to replies, some 61% of those queried.

Vibrationless Hammer?

TOOTH RATTLING VIBRATION has been taken out of pneumatic hammers, say researchers at Armour Research Foundation, Chicago. They have adapted principles of recoil systems for high-rate-of-fire weapons—placing a pneumatic spring between handle and main mass of the hammer. This is done without excessive pressure loss or reduction in work, and the hope is to attain the same work output as standard tools with no increase in weight and some actual simplification. Thus far, however, there is still work to be done in this direction.

Testing the Unbuilt

ALLISON DIVISION, GM, has purchased from Berkeley Div of Beckman Instruments a huge analog computer, 6 x 60 ft, to simulate jet turbines electronically. With it, designers can picture an engine in action under various conditions before it has been built. It can also evaluate data gathered in testing present engines. It is expected to condense man-years of data into man-weeks. Biggest unit thus far built by Berkeley, the unit will be housed in 29 cabinets and weigh 10 tons. It includes 12 map readers to represent various functions mathematically, and 80 function generators—five times the previous high.

Flexible Tunnel

WALLS that flex to control air speed are a feature of a wind-tunnel throat of stainless steel at the Lewis Flight Propulsion Lab of the NACA at Cleveland. Air speeds up to 2300 mph will be created—from 2 to $3\frac{1}{2}$ times the speed of sound. U S Steel rolled special large plates of stainless "W," the biggest plates thus far made at Homestead (then had to reopen the South Charleston, W Va, Naval Ordnance Plant to handle heat-treating, pressing and machining. There is also a second throat to decelerate the air again to conserve energy. Wall flexing is done by jacks, and total steel requirement is 722 tons.

Federalese

Additions to the Pentagon dictionary:

TO CLARIFY: to fill in the background with so many details that the foreground goes underground.

RELIABLE SOURCE: The guy you just met.

News of Metalworking . . .

Materials Handling Goes Glamorous

CLEVELAND—Style has invaded the fork-truck field. The stamp of the auto industry is on the streamlined bodies, two-toned paint jobs, and chrome trim on many new models. In mechanical improvements it shows up in power steering, automatic transmissions, foam rubber seats, and even a 12-volt electric system in one line.

This is the dominant impression gained from the Materials Handling Institute's Exposition held here June 5 to 8. The Institute (an association of manufacturers of materials handling equipment) has been holding a show every second year. With the growing size of the industry and the impractibility of redesigning equipment every year or two, tentative plans call for the next Exposition to be held in 1959.

More than 20,000 visitors this year saw $4½ million in mechanical handling equipment. The 160 exhibitors showed conveyors, lift trucks, hoists, monorails, cranes, and auxiliary and special handling equipment.

Working Demonstrations

One of the most interesting devices shown was a Baldwin-Lima-Hamilton fork lift truck weighing system. Using the SR-4 strain gage, the device is installed directly on a truck—in many cases eliminating platform scales because the truck itself weighs the work. Direct reading instruments permit weigh-counting for inventory control, batch process weighing, check-weighing incoming shipments, and weighing interplant shipments. Load on the forks is transmitted directly to the sensing column. Weighing accuracy is reported at 4% of full range or better.

Many exhibitors set up working demonstrations of their equipment so that visitors might operate mechanisms and try new developments themselves. Yale & Towne, for example, employed a theater-like booth in which a gas lift truck carried a 2400-lb roll of paper balanced on a tilting board. The operator received and acknowledged orders over a two-way radio while manipulating the roll of paper. Sensitive controls were demonstrated here by a 4000-lb weight lowered to touch a raw egg without breaking it.

An operating crane demonstrated by American Monorail Co was installed at eye level, instead of in its normal overhead position, so that visitors were able to run it without moving it. This firm also showed a completely automatic electronic dispatching system for monorail equipment. In this setup, the operator selects a station to which the electric hoist is to be sent, throws a switch, and the crane is automatically dispatched to that spot. Another working model demonstrated by American Monorail was a crane on a 6-ft table. Visitors were able to run it to demonstrate pushbutton operation for stacking boxes, cartons, and pallets of material.

A complete materials handling system of power- and free-conveyors was exhibited in miniature by Jervis B Webb Co. The scale model included every detail—with hooks, attachments, and carriers. Controlled automatically from a central panel, the system demonstrated control of inventories, automatic feeding of materials to and through production and vertical lift and movement of materials.

An exhibit by Barrett-Cravens Mfg Co showed a system of radio impulses in a wire buried in the floor or suspended overhead to control a truck. Through a central control dispatch system, one man employs radio waves and electronic controls to make the truck and its trailers stop at various points, start up and move to wherever loads are to be delivered, then move on to the next pick-up or discharge point.

Cleveland Tramrail Division of Cleveland Crane & Engineering Co employed a huge crane with a grab attachment to demonstrate maneuverability. Here, a 6000-lb. roll of paper, 7 ft long and 5 ft thick, was lifted and turned from horizontal to vertical to maneuver it into any desired position.

Towmotor Corp had a lift truck elevated above the floor and equipped with mirrors so that visitors could work levers to operate the truck and observe the results. Comparison between manual and power steering was demonstrated by one of each of these mechanisms connected to a mechanism that varied axle pressure to simulate loads of various weights.

Clark Equipment Co had three exhibits to show 35 machines. Pneumatic-tired fork trucks in capacities up to 35,000 lb and Clark's two newest straddle carriers were demonstrated under actual field conditions. Among the latest machines developed by this firm and shown here for the first time were: the "Series 71" 10,000-lb straddle carrier, with synchromesh transmission and hydraulic load hooks; the "Series 93" 30,000-lb straddle carrier, equipped with a 5-speed synchromesh transmission and 4-wheel radi-arc steering and the "Hi-Lo" line of tilting hand trucks in capacities of 1500, 2000, 2500, and 3000 lb. An elite fork truck line with self-adjusting brakes, new automatic transmission, swing-up hood, and other features (AM May 21 '56 p174) emphasized simplicity of maintenance and serviceability.

Technical Sessions

Sponsored by the American Materials Handling Society, 12 technical sessions included papers by top management specialists. Included in the sessions were meetings on work measurement, stock positioning and space control, and plant layout.

Returns on investments were stressed by George G Raymond Jr, president of the Materials Handling Institute and of Raymond Corp. He described how materials handling proposals should be presented to top management—pointing out that management is more interested in returns on investment than in equipment, layouts, and methods. The successful performance of management is measured by operating profits—consequently such proposals are weighed from the point of view of how much they will earn for the company and how they will improve profits. Mr Raymond emphasized that "any proposal for an expenditure should show first the cost, secondly—how fast this cost will be absorbed by the savings made—and then how additional savings will increase profits."

A step-by-step program for effecting greatest possible savings through efficient materials handling planning when building new plants was outlined by James Apple of Michigan State University.

TOOL CONTROLS:

Ultimately–the seventh decimal place at 500 lbs hydraulic pressure?

DETROIT—With machine tools already here that figuratively say "Oops, Sorry!" and toss out defective parts they have made, the day may not be so far off when hydraulic machine tool controls will be able to produce metal parts to tolerances of a millionth-of-an-inch. That's the opinion of machine tool builder Louis Polk, president of Sheffield Corp, Dayton, Ohio, and president of the National Machine Tool Builders' Association, keynote speaker at the Vickers Second Production Machine Tool Hydraulic Forum, held here May 24.

The Goal: Improved Hydraulics

Upwards of 175 top operating men, technicians and executives from a wide cross-section of Metalworking took part in the Forum at the invitation of Vickers Inc, Detroit hydraulic pump manufacturer. The goal: to spark discussions that will lead to improved hydraulic products, system design, and better maintenance methods.

Hydraulic vs Electrical Interlocks

First of three sessions dealt with circuit problems, fittings, tubing, and petroleum and fire resistant fluids. Typical of questions raised: "Do machine tool users prefer to interlock complicated machine tool circuits hydraulically rather than electrically with solenoids, relays and limit switches?" Consensus was that users prefer electrical interlocks for flexibility and control. Cycle changes are easier and trouble shooting is simplified. This interlock also permits adaptation of new proximity switches to replace those with moving parts, as well as Cypak and other devices. Hydraulic interlocks were said to be somewhat less troublesome but electricals are easier to apply.

Chatter in broaching with hydraulic machines also came in for spirited discussion. It was pointed out that this common complaint is not limited to hydraulic broaches but is often encountered in mechanical machines too. Much of it results from interrupted cuts, and tool design is really the place to look for improvement. The hydraulic system, however, must be tailored to suit the tools—for example, proper back pressure can compensate for chatter. One user said 80% of cases investigated were found to be the result of holding work improperly. A builder suggested reducing pressures in long broach cylinders: his company went from 1000 psi to 750 psi to reduce chatter.

In questioning user preference for separate power units for each head of a transfer machine vs operation of several heads from one pump, consensus was in favor of individual units for each head, although manifold units are more practical for clamping and transferring.

Fittings and tubing received considerable attention in discussions about sizes needed to prevent high velocities with attendant overheating and increased leakage. Piping of drains was considered, too, as was shock in systems resulting from inadequate tubing supports. One way suggested to absorb shock: use materials other than steel for hydraulic tubing supports. Spacing of supports is critical and should be adjustable, according to one user. A builder recommended flexible hose. Another suggested reducing shock by using more valves in a system.

Tubing: Inside or Outside?

Location of tubing inside a machine for the sake of appearance vs outside for easy maintenance was covered, too. It was apparent that both builders and users prefer outside installations for better cooling and more workmanlike installation. Surge is more readily apparent when tubing is outside too. And when tubing is inside, the heat generated can distort the base of a high-production machine. One builder recommended installing piping in a trough in the floor so that coolant could also reduce heat generated in the circuit.

General reaction to new internal straight thread "O" ring boss fittings was favorable. One large user reported replacing all tapered pipe threads with the new design and has published a report recommending their use. Vickers is adopting straight thread components and it was also noted that SAE has adopted the system.

Flareless tube fittings are generally accepted in the industry too. Good results were reported by a number of users, although one pointed out that assembly is a problem. Builders pointed out that they are better applied with heavy-wall tubing than with thin-wall because of the danger of cutting action, but in general it was conceded that they are more versatile and are preferable to the old type.

Needed: Miniature Valves

In the area of pump and valve design, miniature hydraulic controls need valves as small as 1/3" with capacities around 3 gpm. Miniature sequence valves for clamping are needed, too. And there is need for small valves in individual spindles of multi-head machines, and for standard flange connections on small and large pumps. Although it was pointed out that straight threads may make such connections unnecessary, general opinion of attendees polled favored flanges.

KEYNOTER LOUIS POLK . . .

". . . limitless progress in hydraulics, reaching out toward infinite precision, aided by new machine tools and measuring devices"

News of Metalworking . . .

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Chicago

More Gear Standards on

HOT SPRINGS, VA—A year marked by exceptional activities in standards was completed with the fortieth annual meeting here of the American Gear Manufacturers' Association, June 3-6. Nine standards, three tentative standards, and three information sheets were published during the year, four standards were withdrawn, and a number of others are soon to be published.

Among tentative standards soon to be published are: 123.01, Multiple-thread Coarse-pitch Hobs; 124.01, Worm-gear Hobs; 231.51, Pin-measurement Tables, Involute Spur Gears; 234.01, Worm & Wormgear Inspection, Tolerances and Recommended Backlash; 411.01, Design Procedure for Aircraft Speer Gears; 151.01, Application Classification for Gearmotors; 203.01, Fine-pitch 20°-Involute On-center Face Gears.

A Machine-tool Gearing Task Committee has been formed, and first studies indicate there is definite interest in a standard on such gearing (41 of 54 companies replying are in favor). Extensive work is already under way on aircraft gearing; a new aircraft bevel-gear standard is scheduled for later in the year, as well as recommended practice for assembling bevel gearing. Four special task committees are working on aircraft-gear standards.

The Gear Rating Coordinating Committee rendered its report as a 3-part symposium in printed form (AGMA 229.03). A monumental engineering work, it includes geometry factors and allowable stress (E J Wellauer of Falk Corp), modifying factors (D W Dudley of GE), and a method for estimating fatigue life of bevel and hypoid gears (Wells Coleman of Gleason). A tentative standard on strength of gear teeth (225.01) is being developed.

This meeting was the largest thus far of the Association. Some 369 were registered, about 50 more than last year. Most of the program was given over to committee meetings on standards and tentative standards.

John Flagg, of Watson-Flagg, received the Connell Award, given pe-

Elected to Gear Manufacturer's

James F Murray
Winsmith Inc
Springville, N Y

H O James
D O James Gear Mfg Co
Chicago

Charles L Kessler
Beaver Gear Works Inc
Rockford, Ill

CONNELL AWARD RECIPIENT
John H Flagg
Watson-Flagg Machine Co
Paterson, N J

the Way

riodically to an individual who has made outstanding contributions to the gear industry. The last previous Connell Award was given by the Association in 1954.

Two papers were presented in addition to the aforementioned Task Committee report. One was "Present and Projected Airframe Control Gearing Requirements," by R W Weber of Convair. The other was "Authority Delegation in Medium-sized Owner-managed Business," by Robert S Hall of McKinsey & Co.

There are now 176 members of the Association, an increase of seven in the past year. Financial condition of the Association also improved about 10% during the year.

Britain's Auto Industry Has Its Doldrums, Too

LONDON—Britain's automotive industry is following the downtrend in sales and output of its U S counterpart. And, like U S automakers, British carbuilders are finding it tough going after three years of booming sales and output.

Output 'Way Down from '55

The British Board of Trade estimates that first quarter automobile production in Britain was down by 17,331 units from 1955 levels. And for the first four months production has been down by 56,066 units—indicating that the drop is getting worse instead of tapering off. A decline in the export market has had a great deal to do with it—exports fell off by 33,734 units in the first four months.

Decline Follows Boom

This decline in production and exports this year should be seen as a counterpart of the great increase in output during the past three years. Production exactly doubled between 1952 and 1955 in terms of the number of cars turned out—from 448,000 in 1952 to 897,560 in 1955.

Production Is 9% Behind

Taking the last two years alone, production increased by 16% between 1954 and 1955, but in the first four months of this year only 274,270 cars were produced, some 9% less than in the same period last year. In April alone, production was 58,947 units, about 13% less than in April last year.

But the export story is more disquieting. Although shipments of passenger cars, including taxis, increased from 309,890 in 1952 to 373,203 in 1955, or about 25% in three years, the increase in the last two years was only 2% and in the first four months of this year shipments were 24% less than in the same period last year. The rate of exports this year has decreased to little more than the rate of 1953.

British commercial vehicles, on the other hand, are still holding their own in export markets. Production of goods vehicles, after remaining static for three years, increased last year by over 25%, and the expansion has continued this year, although at a somewhat slower pace. The output of public service vehicles increased by about 20% last year and the trend is still upward, though not quite so rapidly as last year.

Exports of goods vehicles last year were 154,253, nearly 50% of production. The number exported was about 25% more than in 1954. In the first four months exports were 3% down from the exceptionally high figures of last spring. Exports of public service vehicles amounted to 3,206 last year and have continued to increase. In the first four months of this year 1,273 were shipped abroad, compared with 951 in the same period last year.

Setback Still Moderate

Compared with the great expansion that has taken place in the British motor industry, the above figures clearly show that the setback is still moderate. They do, however, confirm the view, expressed by many observers in Britain at the moment, that British manufacturers are continuing to run into severe competition abroad, especially from Germany, France and Italy. It will be some time before the results of their frantic efforts to regain lost ground in these markets can be assessed.

1956-57 Executive Committee

Charles F Bannan
Western Gear Works
Lynwood, Calif

Robert M Honegger
Farrel-Birmingham Co
Buffalo, N Y

Senate Attacks Government's

WASHINGTON — The government's machine tool program comes under heavy critical fire in a Senate report to be published shortly. The Senate Small Business Committee censures the Defense Dept and Office of Defense Mobilization for failing to carry out Vance Committee recommendations on machine tool stockpiling and other production equipment policies, and calls for a stepped-up Pentagon program for tool replacement.

The report is a follow-up to the committee's two-day hearings last February on changes in machine tool mobilization policy. The new government policy is to get more reserve tools into current production. It allows the services to break up idle tool packages to use individual pieces of equipment. It also cuts out a special Defense Dept fund for tool stockpiling, makes each service responsible for keeping reserve tool stocks updated with machines bought from its own regular procurement funds.

Vance Plan Pigeonholed?

Among the report's chief findings:

● "Scant attention" has been given the 1953 Vance proposal for a large-scale, Defense Dept-financed Machine Tool Reserve Program. Yet, production demands on the machine tool industry in a future emergency —"whether it be a major war or another Korea"—will be heavy. A "partial answer to this strategic dilemma is to implement Vance Committee recommendations for the advance procurement of long lead-time tools in support of a mobilization base program." Despite changes in strategic concepts—stressing procurement of equipment needed in the initial phases of a future war and deemphasizing requirements for a long drawn-out mobilization—"there is still a great deal of merit in the Vance Committee recommendations for establishing a mobilization reserve."

Military machine tool funds should be listed in a special category in the defense budget so "Congress can determine their adequacy . . . (and) to guarantee that machine tool procurement is not lost in the bureaucratic maze." Right now, "machine tool expenditure data are not available even in the Office of the Secretary of Defense."

● The military machine tool inventory has "received no significant input since Korea. Furthermore, no systematic machine tool program can be instituted prior to fiscal year 1958." The committee asked that funds be "gleaned" from the 1956 and 1957 budgets to start a machine tool replacement program. "Otherwise, another full year will slip by without improvement of the national machine tool asset." (Actually, the Navy is getting ready to award $3.5 million worth of tool orders to replace current inventories. See p103.)

As one factor playing up the need for a speed-up in current military tool procurement, the committee said little reliance should be placed on converting general-purpose production equipment in civilian industry to future war production. It cited a trend away from general purpose tools to special purpose equipment, mainly in the automotive industry.

The Committee said it was "shocked" that less than $16 million had been committed to stockpile machine tools since the Vance recommendation three years ago. The Vance group had proposed a program ranging from $600 million to $1.5 billion over this period. Appropriations for the program have totalled $450 million.

Responsibility for "failure to come to grips with the Vance concepts" was placed on Defense Mobilization Director Arthur S Flemming and top Pentagon officials. During the hearings, however, Harold S Vance, now an Atomic Energy Commissioner, backed away from his original recommendation. He said thermonuclear developments since 1953 make it likely a future war would be decided quickly with weapons and equipment on hand, and that there might not be time to activate reserve production capacity. The shift in machine tool policy stems from this philosophy.

The committee criticized the new policy allowing the breakup of standby tool packages, said this is "a potential means for expending the most usable tools in the reserve to the long-range detriment of our machine tool asset." Says the report: "it would be an error to permit a 'grab' of the more modern tools in the standby packages to meet immediate schedules at the cost of weakening our ability to cope with an emergency a few months or years hence."

The Committee scoffed at the Pentagon's reasoning for not using reserve tool procurement funds to buy equipment for current production. Defense Dept officials have interpreted the appropriation bills' language as specifically restricting tool buying for reserve purposes. The Committee said the officials 'made no effort to change the language (of the law) to meet what they now express as the essential need."

The Committee noted a "certain contradiction" in Pentagon statements on adherence to Vance's concepts of a mobilization machine tool reserve, said that "some organizational confusion exists in the Defense Dept."

"On one hand, government witnesses testified that the revised program is in accord with the Vance concept," reported the Committee. "On the other, their testimony was based heavily on requirements for current use tools. Viewed in the light of their history of disinterest, testimony before (the) Committee suggests either a lack of candor in explaining the reasons behind the revised policy or is indicative that key Dept of Defense officials have not faced up to the policy problems inherent in a comprehensive, clearly-defined machine tool program."

The committee said Vance's proposal for advance procurement of machine tools for mobilization purposes is "still sound." But "this does not negate urgent requirements for special tools to meet current production schedules nor does it lessen the urgency of modernizing the government inventory with resulting economies. This is not a question of 'either/or' but of 'both.'"

On strategic concepts, the Committee said it wasn't trying to determine whether future wars would be big ones or little ones. It said, however, that "in the absence of

Machine Tool Policies

clear testimony . . . and in the face of the admitted doubts of responsible officials . . . it is inclined to agree" with Assistant Navy Secretary Fogler, who told the Committee: "From an insurance standpoint (it is) very unsafe to assume and make all the preparations on its being a short war."

The Proposals

The committee offered these proposals for the Pentagon's new Tool Replacement Program:

- Annual percentages should be based on the replacement costs of current tool inventories. The policy now is to replace tools in active use at a rate "not less than 2% or greater than 5% of the total listed inventory value per year."
- The 2-5% should be increased. "Progressive industry uses an annual depreciation rate of 8-15% to maintain efficient tools." By this standard, the Committee called the Pentagon's plan "unrealistic."

Said the Committee: "Assuming a 5% yearly replacement rate based on inventory value, it would take nearly 40 years to replace the current machine tool inventory with no provision to modernize the tools in standby packages or to replace the replacements. Considering the present age of government machine tool holdings, the current directive suggests that the government will continue to pay the high cost of utilizing obsolete machines."

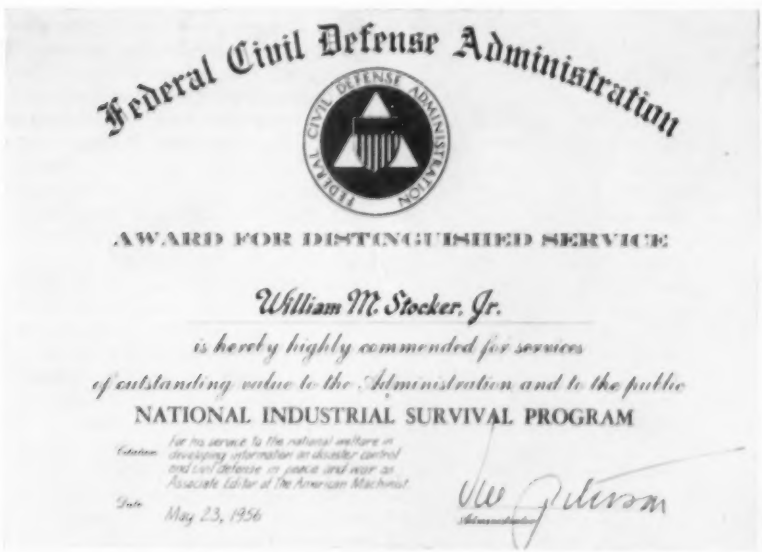
No Complacency, Please!

The committee asked the Defense Dept not to be "complacent about the health of the machine tool industry just because of a recent upturn in orders." "It is alarming," the report stated, "that key defense officials have shown small concern over this aspect of machine tool programming despite the guidance of the Vance Report."

All-Aluminum Auto Radiators?

ATLANTIC CITY — An all-aluminum automobile radiator made by brazing or soldering may ultimately be adopted, but the first step in that direction will probably be to aluminum fins with brass tubes. This is the conclusion drawn from a series of papers presented at the summer meeting of the Society of Automotive Engineers held here June 3 to 8.

And even this change will be made only if the combination is cheaper to mass produce than the present radiator—in spite of aluminum's weight saving and improved cooling characteristics, according to William S Gale, whose company, McCord Corp, started experiments on aluminum radiators in 1944, stepped them up when a copper shortage threatened in 1941. McCord developed corrugated fins of 1100 and 3003 aluminum about 0.007 in. thick, uses a 30% tin-70% zinc solder with a flux that is a water solution of hydrazine compounds. Baking cycles vary from 1 to 4 minutes at 700 to 800 F.


Federal Civil Defense Administration

AWARD FOR DISTINGUISHED SERVICE

William M. Stocker, Jr.

is hereby highly commended for services of outstanding value to the Administration and to the public

NATIONAL INDUSTRIAL SURVIVAL PROGRAM

Citation: For his service to the national welfare in developing information on disaster control and civil defense in peace and war as Associate Editor of the American Machinist

Date: May 23, 1956

AM Editor Cited for Disaster Control Report

SPECIAL REPORT ON DISASTER CONTROL (AM Feb 27 '56, p 129) won two awards for distinguished service from the Federal Civil Defense Administration recently. Associate Editor William M Stocker, Jr (photo) received the individual award pictured above "for his service to the national welfare in developing information on disaster control and civil defense in peace and war." American Machinist, too, received an award "for its meritorious contribution to the national welfare through the publication of special reports and articles and the production of a motion picture on methods of disaster control and civil defense in peace and war. The award-winning 32-page special report brought up to date a similar article published in 1950, which served as a guide to all industry

Field Report USA:

West Coast Machine Tool Exhibit Draws 4000

MORE THAN A HUNDRED LATE-MODEL MACHINE TOOLS were featured in operation at the opening of Moore Machinery Co's new 21,000-sq-ft showroom at Berkeley, Calif. Four cranes are required to handle the machines, which used a combined connected power load of 500 hp. More than 4000 visitors attended the opening

East...

Eastern newsnotes . . .

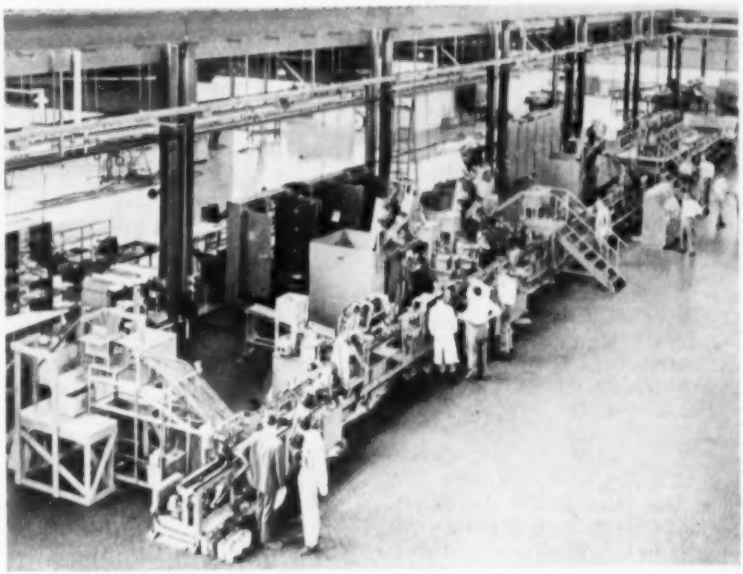
First New England firm to get a Dept of Defense Reserve Award is **Norton Co,** Worcester, Mass, maker of grinding machines and wheels, for wholehearted cooperation in helping its employees who are armed forces reservists to participate actively in reserve programs . . . **WaiMet Alloys Co,** Waban, Mass, has become a division of **Consolidated Foundries & Mfg Co**—it was formerly known as WaiMet Engineering Co . . . Last tanks to be produced by **Chrysler** at its Newark, Del, plant—a trainload of Patton M-48's, were shipped out May 21. This shipment closes out a $160-million Army Ordnance order, winds up tank production at Newark, which will now be converted to Plymouth output . . . **Bethlehem-Sparrows Point Shipyard,** Baltimore, may soon start production of 42,000-deadweight-ton ships, probably tankers . . . **Black Mfg Co,** Harrison, N J, maker of spray guns and equipment, is moving to bigger quarters at Livingston, N J . . . Average weekly take-home pay of factory workers in the metropolitan New York area is running at an all-time high—15¢ above the previous peak attained in March 1956 and December 1955 . . . **Sun Tube Corp,** Hillside, N J, has installed what it claims is the world's largest high-volume horizontal impact extrusion machine, a Herlan P12, to mass-produce rigid shells and parts in diameters to 5 in., with length-to-dia ratios to 12:1 . . . **Nesco Steel Barrel Co** has filed a charter of incorporation in Delaware. Authorized capital stock is $1 million . . . **Smith-Gates Corp,** Plainville, Conn, farm and home heating equipment maker, expects to double its production floor space with a new $100,000 plant at Farmington, Conn . . . **Minneapolis-Honeywell Regulator Co** is getting ready to move its Transistor Division from Minneapolis to Boston . . . **Mosler Safe Co** will build a multi-million-dollar electronic burglar alarm plant on a 7½ acre Danbury, Conn, site . . . **A H Nilson Co,** Bridgeport, Conn, builder of metal and wireforming machines, has to get out of the right-of-way of the New York-Killingsley Expressway, will build a 40,000-sq-ft plant at Shelton, Conn—25% more production space than its present plant . . . **Tyron Inc** has been formed at Cambridge, Mass, to do contract research and manufacture in such fields as heat transfer, fluid mechanics and corrosion resistance. Its heads are MIT profs . . . **Eastern Brass & Copper Co** has dropped its metal warehousing in favor of custom milling . . . **Sylvania Electric Products Inc** has purchased a 28,000-sq-ft plant at Hillsboro, N H, from **Shaw Container Corp,** will make transistors and crystal diodes there . . . **Induction Motors Corp,** Westbury, L I, N Y, plans to double its production facilities in the coming year . . . **Glenn L Martin Co,** Baltimore, has been selected by the Air Force to develop the first supersonic tactical bomber . . . **Tube Manifold Corp,** North Tonawanda, N Y, fabricator of tubular products, has opened a new 82,000-sq-ft plant there . . . **Stainless Welded Products Inc,** Clifton, N J, has changed its name to **Swepco Tube Corp.** It recently moved from Jersey City to Clifton . . . **Lux Clock Mfg Co,** Waterbury, Conn, is expanding into contract manufacture of powdered metal parts.

South...

Dixieland newsbriefs . . .

American Bosch Arma Corp has just dedicated a $1.16 million addition to the Columbus, Miss, plant of its subsidiary, **American Bosch Arma**

Mississippi Corp. The addition will be used for manufacture of generators, small electric motors, voltage regulators, electric windshield wipers . . . **Texas Instruments Inc** has bought out **Wm I Mann Co** of Monrovia, Calif, maker of precision optical components . . . **Lockheed Aircraft's** Marietta, Ga, plant has launched a plantwide safe driving contest for its 18,000 employees. It works this way: all employees who join the "Star Drivers' Club" (10,000 already have) are eligible for a telephone quiz contest on safe driving slogans. Weekly awards over a four-month period will total $2250 in U S Savings Bonds. Also the five best employee-invented safety slogans each month get a $25 bond . . . **Temco Aircraft's** Greenville, Texas, plant has a $2-million contract for major overhaul of C-97 transports for the Air Force . . . And **Temco** has also been awarded an Air Force prime contract to increase its output of F-100 Super-Sabre pylon assemblies . . . **Atlanta** is going ahead full speed with its industrial development . . . **Square D Co,** Detroit has just announced plans for a $500,000 plant there to house its regional offices and manufacturing facilities for electrical distribution and control devices . . . Also out of **Atlanta** comes the announcement that two of the country's oldest used textile machinery firms will merge . . . **Comer Machinery Co Inc,** Atlanta, and **Cotton Mill Machinery Co** of Charlotte, N C. The Charlotte operation will be known as **Comer Machinery Co of North Carolina.** Both companies have been concerned with the buying and selling of used machinery, making appraisals of machinery and mill properties, and handling financial transactions involved in the textile industry . . . Industry is beginning to give tourism a run for its money down in Florida. **General Electric** has just announced plans for two multi-million dollar plants for the Sunshine State. Gainsville is to get a $4-million dollar plant that will house headquarters and manufacturing facilities of **GE's** communications Equipment section, now centered in Utica, N Y. One of the biggest boons to the Gainesville area is this: almost all of the 1700 employees will be recruited locally. The new facility will be in operation in about two years. GE will also build -a -multi-million -dollar St. Petersburg plant, which will be in operation by December and will pro-



Cylinder Head Assembler for GM

DEVELOPED AT GM'S TECHNICAL CENTER, and slated for Oldsmobile output, this 137-ft cylinder-head assembly machine will assemble 75 parts into completed cylinder heads for the Rocket engine. Head is placed on an indexing transfer line that moves head intermittently from station to station for assembly of valves, plugs, head bolts, etc. At the same time, machine indicates improperly secured valves to insure uniform quality in assembly

Chem-Milling Pilot Plant Goes to Work

WORLD'S FIRST PILOT PLANT for precision milling of steel and titanium by the chemical etching process is now in operation at North American Aviation's Missile Development Division, Los Angeles. It's operated jointly by North American, developer of the Chem-Mill process, and Turco Products, licensor of the process. The tiny (800 sq ft) pilot plant purposely demonstrates that Chem-Mill operates in areas smaller than those occupied by equivalent machine tools. Here, technicians measure depth of etch on a Chem-Milled part for North American's SM-64 Navaho missile

Field Report USA:

duce super-secret electronics equipment for **Sandia Corp.** of Albuquerque, N M, a prime contractor for the Atomic Energy Commission.

Midwest...

Midwestern newsbriefs . . .

Peninsular Metal Products, Ferndale, Mich, maker of automotive interior and exterior moldings and assemblies, has added 56,000-sq-ft to its plant, with more expansion to come . . . **Detrex Corp,** Detroit, which will shortly change its name to **Detrex Chemical Industries,** will diversify into manufacture of package conveyors now made by **B & G Machinery Co,** Indianapolis. It'll make them in a new plant at Bowling Green, Ky . . . Chicago reports setting new records in industrial construction in May . . . **Hammond Organ Co** has purchased a 150,000-sq-ft building in Melrose Park, Ill, will add a second 150,000-sq-ft structure to the premises . . . **Cole Products Corp,** Chicago, has started construction of a 30,000-sq-ft automatic drink dispenser plant northwest of Chicago . . . **Lindberg Steel Treating Co** is adding 36,000-sq-ft to its Melrose Park, Ill, plant . . . **Winzeler Mfg & Tool Co,** Chicago, will build a 20,000 sq-ft plant in Harwood Heights, Ill, for manufacture of stamped gears . . . **Caterpillar Tractor Co** will transfer its Parts Department Division from Peoria, Ill, to a new plant at Morton, Ill. It'll employ 1000 . . . **Frigidaire Division of GM** recently closed down five of its plants for two days and laid off 1900 employees "to make adjustments in production schedules" . . . Also laid-off: 600 employees of **General Electric's** Electric Range and Water Heater Dept, Louisville, Ky, for two weeks starting June 11 . . . **Charles Bruning Co Inc,** Chicago manufacturer of engineering reproduction machines, will build a 275,000-sq-ft plant at Mt Prospect, Ill . . . **Tillotson Mfg Co,** Toledo carburetor producer, will add 26,000-sq-ft to its plant . . . **Dana Corp,** automotive transmission manufacturer of Cleveland has been forced to lay off 25% of its 2100 workers because of sudden cutbacks in orders from truck manufacturers . . . **Chevrolet** has now taken delivery of some 900 machine tools for its Cleveland automatic transmission plant, slated to go into operation early next year . . . **Alloy Precision Castings Co** has leased a 23,000-sq-ft plant in Cleveland, will move its other Cleveland investment castings operations there . . . **National-Standard Co,** maker of wire and special machinery, has started construction of a 22,000-sq-ft addition to its Niles, Mich, plant . . . **Lincoln Electric Co,** Cleveland, is increasing the capacity of its 860,000-sq-ft plant by 35% at a cost of around $2 million, by laying 120,000-sq-ft concrete slabs at the east end of its plant. Purpose: outdoor storage of raw materials. There's $5-6 million more expansion upcoming, too . . . **Cleveland Pneumatic Tool Co** production employees, who own 49% of stock, have done it again—striking when demands for a 17¢-an-hour increase were turned down by "exempt" employees who own the other 51% of company stock.

West...

Around the West . . .

Hycon Mfg Co, Pasadena, Calif, has formed a Camera & Instrument Division to consolidate its Photographic Products and Special Products Division into a single operation . . . **Boeing Airplane Co,** Seattle, has arranged an open line of credit for $75 million with 17 banks across the country to finance research and manufacturing expansion . . . **National Motor Bearing Co,** Redwood City, Calif, and **Federal-Mogul-Blower Bearings Inc,** Detroit, are merging under the latter's name . . . **North American Aviation,** Los Angeles, is doing "research and development on a manned aircraft, the X-15, for investigation of high altitudes and temperatures" . . . **Bethlehem Pacific Coast Steel Corp** will build a $6-million wine tanker for United Vintners Inc (Petri wines) with completion of the 530-ft vessel slated for next May . . . **Speed-D-Burr Corp,** Glendale, Calif, is building a $250,000 barrel-finishing laboratory . . . **Axelson Manufacturing Co** has started construction of a $1-million addition to its Montebello plant for expanded production of aircraft landing gear and other components . . . **Harvill Corp** will begin work shortly on a new 125,000-sq-ft plant in Santa Ana, Calif, to house its die casting facilities and Tork-Master Division. The expansion is expected to give Harvill an increased production capacity of 70% . . . A new 60,000-sq-ft building for the manufacture of aircraft and automotive components by the Karl-Douglas Division of **Thompson Products** is under construction in Long Beach, Calif . . . **Hughes Aircraft Co** has received $39.4 million worth of Air Force contracts for production and maintenance of armament control systems used for automatic target sighting and weapons discharge in all-weather interceptor planes. Production will be handled at Hughes' El Segundo plant.

$7 Million Foundry for Bullard

NEW ENGLAND'S MOST MODERN GRAY IRON FOUNDRY, built at a cost of $7 million adjacent to the machine tool plant of The Bullard Co in Bridgeport, Conn, was shown to the press in a special preview June 8

David A Wallace (left), sales manager of Cincinnati Lathe & Tool Co, has been elected vice president, sales. **E L Ritter,** chief engineer, has been appointed vice president, engineering

Richard D Keller has been appointed assistant sales manager of the machine tool division of Pratt & Whitney Co, West Hartford, Conn. He has been serving as divisional specialist in the sales of Keller automatic tracer-controlling milling machines.

Names in the News . . .

Albert L Breuer has been elected vice president in charge of machine tool sales for Onsrud Machine Works, Niles, Ill. **Robert M Miller** has been appointed vice president, woodworking machinery sales, and **Earl Pankonin,** vice president, engineering. **G M Campbell,** vice president and secretary, has been named executive vice president.

Jack R DeBacher has been elected a vice president of Thor Power Tool Co, Aurora, Ill. He has been executive vice president of Thor's Speed-Way Manufacturing Division at Cicero, Ill.

Earl C Hughes, vice president of Bay State Abrasive Products Co, Westboro, Mass, has been named executive vice president; **Harold G Clayton,** factory manager, has been promoted to vice president, manufacturing; and **Elden L Auker,** sales manager, has been appointed vice president, sales.

Charles T Jordan of Charles Parker Co, Meriden, Conn, was elected president of the American Supply & Machinery Manufacturers' Association at the Triple Industrial Supply convention held recently in Atlantic City, NJ. **Robert L Hamilton,** Dumore Co, Racine, Wis, was named first vice president, and **Lyman H Bellows,** Sheldon Machine Co, Chicago, second vice president. **Frank M Cruger,** Indiana Manufacturers Supply Co, Indianapolis, Ind, was appointed president of the National Industrial Distributors' Association. First vice president is **Samuel H Clark,** Samuel Harris & Co, Chicago, and second vice president, **John N Failing** of Chas A Strelinger Co, Detroit. **Ashley DeWitt,** Briggs-Weaver Machinery Co, Dallas, Texas, was named president of the Southern Industrial Distributors' Association. **A V Davies,** Moore-Handley Hardware Co, Birmingham, Ala, is first vice president, and **H B Tonsmeire,** Turner Supply Co, Mobile, Ala, second vice president.

G G Michel, formerly director of manufacturing for Adel Precision Products Division of General Metals Corp, has been elected executive vice president and general manager of the Pachmayr Corp, manufacturer of Turnloc fasteners and airframe components.

Gordon W Smithson, chief engineer of Potter & Johnston Co, Pawtucket, RI, has been named vice president and chief engineer.

Charles V Stevens has been named sales manager of S W Card Mfg Co, Division of Union Twist Drill Co. He was formerly associated with Kearney & Trecker Corp, Milwaukee, as southwestern sales manager.

Harold F Nunn, assistant general manager of the Henry Disston Division of H K Porter Co, has been elected vice president of Henry Disston & Sons, Ltd, Toronto subsidiary.

Alton K Marsters, administrative assistant to the president of Bausch & Lomb Optical Co, Rochester, NY, has been elected vice president, sales.

OBITUARIES

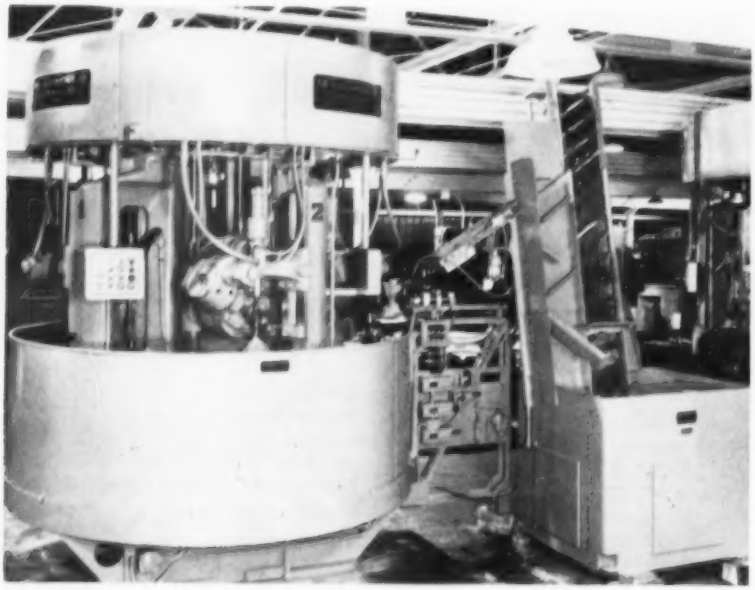
George E Hallenbeck, 78, retired chairman of the board of Baker Bros, Inc, Toledo, Ohio, machinery manufacturer, died May 27. Mr Hallenbeck, associated with the organization for 57 years, served as president since 1939, and board chairman since 1947. He retired from that post last year.

Raymond J Hurley, 61, former board chairman of the Thor Corp, Chicago, and a director of Thor Power Tool Co, died recently in Evanston, Ill.

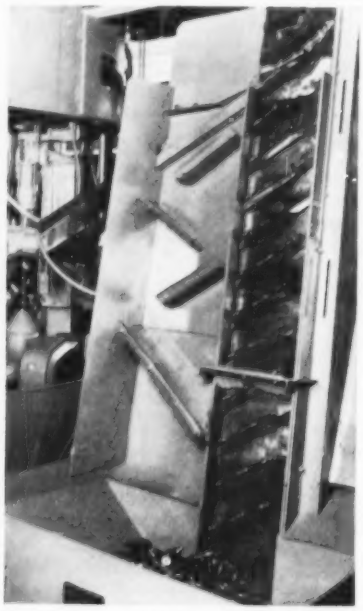
John L Slade, 33, administrative assistant to the vice president of Black & Decker Mfg Co, died June 1. He had served as manager of the portable electric tool company's Hampstead, Md, plant until May 1954.

Fred W Elya, 65, retired northeastern district manager for Norton Co, Worcester, Mass, died May 23.

New Shop Equipment,



ROTARY GEAR HOBBER operates completely automatically, has ram-type loader and unloading mechanism similar to the "Auto-Motion" equipment on company's other hobbers



INCLINED VERTICAL CHUTE incorporates means for orienting parts for delivery to loader. Misaligned and excess pieces drop off into storage bin to be picked up again

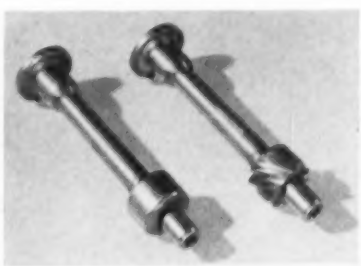
Lees-Bradner Rotary Gear Hobber Mechanically Handles Unusual Part

Work is fed automatically to this four-spindle rotary gear hobber (see cover), positioned, loaded on each spindle, and unloaded at the completion of the hobbing cycle. Part, produced in the plant of a British motor-car manufacturer, is the left-hand helical gear on a distributor driving spindle.

Machine design provides an arrangement by which the part is handled mechanically from its approach to the machine until the point at which the hobbed gear is automatically discharged from the unit. Work, whose unusual shape the special handling system was designed to accommodate, is approximately 5⅛ in. long, with a diameter at its smallest cross-section of ⅝ in. On one end is a flange; located near the other end is that portion of the spindle, 11/16 in. long and 1 1/16 in. in diameter, from which the gear must be cut.

Parts are discharged by a conveyor into a storage bin, on which is mounted an endless belt inclined 10° from the vertical and carrying cleats set at an angle of 30° to the belt's parallel edges. Near the top of the belt mechanism, parts are discharged into a sloping chute which carries them to the actual loading mechanism, where a pair of open jaws receives each part. This device is a ram-type loader, in which the jaws carrying the part advance it to the work spindle of one station and then retract so that the machine may rotate to the next station for unloading and loading.

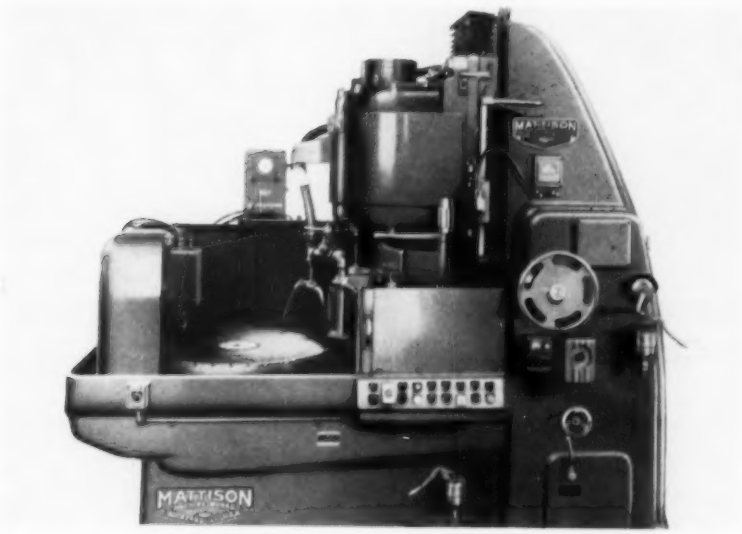
During the hobbing process, work is held between centers and is driven by knife edges on the large diameter. After the machining operation, an open pair of jaws located beside the set holding a new workpiece grips the finished piece. Both sets of jaws then swing to the right, removing the finished piece from the work-holding spindle and placing the new piece in position to be clamped by the tailstock, which automatically descends. Finished gear is then retracted beyond the splash guard around the machine, jaws are automatically opened, and the part is discharged. Automatic operation is so timed that each time a work spindle reaches the loading and unloading station a completed part is discharged and a new piece is placed into position to be hobbed.



DISTRIBUTOR DRIVING SPINDLE, shown before and after hobbing, is held gear-end up between centers for machining operation

Lees-Bradner Co. Cleveland 11, Ohio

Materials and Parts . . .



Mattison Vertical Rotary Grinders Offer Automatic Cycling

Models 24 and 36 vertical rotary surface grinders have been redesigned to increase removal rates and accommodate new types of work requiring closer tolerances.

Automatic cycling is available on both models through the use of one of two automatic systems that may be installed at extra cost. Either system will provide pushbutton-actuated cycling, which includes switching on the coolant pump; moving the table into grinding position; magnetizing the table and starting it rotating; feeding to size, according to gaging system; sparking out; and returning all elements of the machine to loading position. Air-gaging system measures work continuously and gives operator visual indication that parts are approaching size. Micro-switch automatic sizing system is an electro-mechanical measuring device which measures work continuously and actuates the automatic cycle at the completion of the grind.

Continuous down-feed system eliminates mechanical linkages found in ratchet-type feeds and increases feed range. Redesigned base is stronger and more rigid, with added cross-girths, than that on older models. Coolant tank is separate from machine, so that changes in coolant temperature cannot affect machine's accuracy. Base casting is Meehanite, stress-relieved by heat-treating. Two flushing nozzles in the base wash sludge into coolant tank.

Two spindle-drive systems are offered: one is standard built-in drive with semi-enclosed motor, other is a coupling-type drive with standard TEFC motor which is particularly suited to large shops which customarily replace motors from stock.

Standard equipment on Model 24 is a 30-in. magnetic chuck and 18-in. segmented wheel; available options include a 36-in. chuck and 20-in. wheel. On the Model 36, a 36-in. magnetic chuck is used with an 18-in. wheel; 40-in. chuck and 20 and 22-in. wheels are available optionally. Wheels use standard segments that can be fitted to other size wheels. Both machines are designed for heavy stock removal, with a 40-hp motor standard on Model 24 (50-hp is available on special order) and a 50-hp motor on Model 36.

Mattison Machine Works, 545 Blackhawk Park Ave, Rockford, Ill

. . . including

MACHINE TOOLS AND ACCESSORIES

Second-Operation Machine 166
Rotary Gear Shaver 167
Carbide Tool Grinder 170
Engine Lathes 172
Multiple Drill-Tap Head 178

TOOLS AND ACCESSORIES

Hold-Down Clamps 168
End-Cap Marker 172
Metal-Spraying Gun 176
Vibratory Parts Feeder 184

FORMING AND CASTING

Aluminum-Extrusion Press 166
Straight-Side Mechanical Presses 172
Production Shear 182

HEAT-TREATING AND WELDING

Index Welder 168
Titanium Plating Process 168
Spot and Projection Welders 178

CLEANING AND FINISHING

Burnishing Machine 180
Buffing and Polishing Lathe 180
Power-Tilt Tumbling Barrels 182
Elevator Degreaser 188

INSPECTION AND LAYOUT

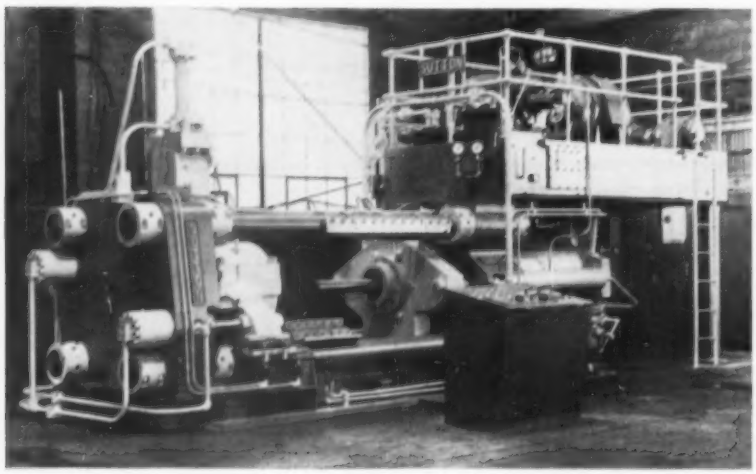
High-Speed Camera 167
Large-Cavity Inspector 170
Black-Granite Surface Plates 176
Noise Analyzer 178

PLANT SERVICE EQUIPMENT

Hydraulic Crane Scales 174
Leveling Jack 184

PARTS AND MATERIALS

Carbide Cutting Materials 166
Electric-Motor Line 196
Ceramic-Fiber Rope 200



Sutton Press for Aluminum Extrusions Has Electro-Hydraulic Controls

Featuring an electro-hydraulic control system developed by the Oilgear and Raytheon companies and applied by Sutton engineers to the extrusion process, extrusion press is available in a model with a 1250/1500-ton capacity. Utilization of the control makes possible high-speed extrusion of 24-in.-long aluminum billets of 5- or 6-in. diameter, at a rate of over fifty per hour.

Control provides for the operator's immediate selection of three different operating cycles: manual; automatic control for dies requiring butt shearing; and automatic control for self-cleaning or bridge-type dies. On both automatic control cycles, the entire cycle pattern including extrusion speed can be pre-set in a few seconds and then followed during an entire production run at a constant rate of operation. Operator can vary the pre-set extrusion speed at any time during a cycle.

Sutton Engineering Co, First National Bank Bldg, Pittsburgh 22, Penna

Carbide Cutting Materials

Two carbide metal-cutting grades have recently been introduced by Carboloy Dept of General Electric:

Grade 860, intended for milling high-tensile cast irons in the higher hardness range of 223 to 248 Brinell, is especially adapted for face-milling operations, but may also be used for plain milling or for slotting. Recommended per-tooth feeds are 0.007 to 0.012 in. at speeds between 250 and 300 fpm.

Grade 330 is a high-titanium carbide with nickel binder which has a transverse rupture strength of about 200,000 psi with hardness of about 91.5 R_A. Because of its hardness and added toughness, grade is less susceptible to chipping or cracking than ordinary carbide grades. It can be ground easily on duplicating-type grinders. When used as a brazed tip, carbide requires use of a special flux to provide proper wetting; company reports that silicon-bearing flux used with high-silver solders gives satisfactory results.

Carboloy Dept, General Electric Co, Detroit 32, Mich

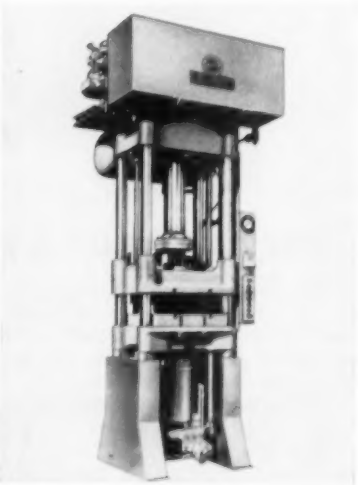
Hardinge Second-Operation Unit Offers Instant Speed Changes

Model DSM59 second-operation machine features instant pushbutton change of spindle speed between 230 and 3500 rpm without stopping the machine. Operator locates best speed for the most efficient chip removal and pushes "faster" or "slower" button on control box located over the headstock.

Machine is designed for chucking partially finished parts and performing close-tolerance turning, forming, boring, drilling, threading, or facing. Special lever-operated collet closer permits opening or closing a collet or step chuck while machine is in operation. Full range of collet tension from light to heavy holding power is possible without use of extra tools. Machine when fitted with 5C round Hardinge collet has 1-1/16-in. capacity.

Preloaded ball-bearing turret-head mounting eliminates play between turret head and turret slide. When less than six operations are performed, time savings can be made with adjustable operating lever which allows rapid swiveling past positions which do not have tools.

Hardinge Bros, Inc, Elmira, NY

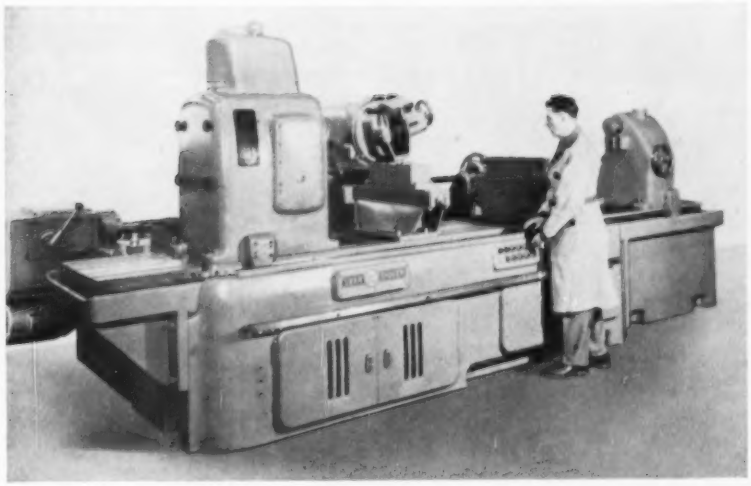


Hydraulic Platen Presses

Line of hydraulic platen presses with capacities of from 50 to 400 tons is designed for metal drawing and forming and plastic and ceramic molding. Available with a wide selection of square or rectangular platen sizes ranging from 18 x 18 to 48 x 72 in., presses will operate either semi-automatically based on a predetermined pressure setting, or can be opened and closed manually by pushbuttons.

Construction features include heavy alloy cast-steel platens, pressed bronze guide bearings, and polished steel posts. Pumping units, made up of a combination of Denison and Vickers pumps, were selected for compactness.

Rodgers Hydraulic, Inc, 7471 Walker St, Minneapolis 16, Minn



Rotary Shaver Handles 48-in.-dia Gears In Crown-Shaving Operations

Red Ring rotary gear shaver, Model GCJ-48, expands the field of crown shaving to include external gears up to 48-in. PD and 62 in. between centers. Spur and helical gears up to 12 in. wide and 52-in. OD in the 2- to-16-dia pitch range can be crown shaved on the machine. Shaving without crowning can be done on spur and helical gears up to 36 in. wide and 142 in. between centers in the same tooth-size range.

Crown shaving is accomplished by a rocking-table action in which the table supporting the head and tailstocks is rocked around a center pivot while the gear is power driven in mesh with a reciprocating gashed rotary gear-shaving cutter. This method produces elliptoid tooth forms on the gear teeth, with slightly thinner tooth sections at the ends of the teeth than in the middle portion, thus avoiding detrimental operating effects possible with tooth end bearing or shaft misalignment.

7-, 9-, and 12-in.-dia cutters are used on the shaver. Machine has a floor space of about 113 x 114 in., and is 82 in. high over-all. A 5-hp motor drives the headstock and a 3-hp motor powers the cutter reciprocation drive.

National Broach & Machine Co, 5600 St Jean, Detroit 13, Mich

Flashlight, called Toolite, fits any tool with a standard square drive. Available in ¼ and ⅜-in. sizes, it throws a beam 200 ft.

Toolite Manufacturing Co, 1712 Warrior Rd, Birmingham, Ala

Haller Screw-Slitting Machine Requires No Manual Attention

Pedestal-mounted slitting machine is automatic in operation, requiring no manual attention except filling the automatic hopper. Unit delivers through a feed track from the hopper to a multi-station indexing plate where screws are clamped in position for transfer to a circular slitting saw.

Timing of the indexing plate is mechanically coordinated with slitting time, and ejection after slitting is automatic. Without special attachments, production rates are around 50 screws per min; with attachments, about 75 screws per min can be slotted. Screw sizes handled range from 0.100-in. diameter by ¼ in. long to ¼-in. diameter by 2¾ in. long.

Accuracy of slot width and depth is controlled by saw thickness and its position relative to the work. This condition is adjustable and is easily changed to suit various conditions.

Coolant is supplied to cutter from a pump and tank in the pedestal. Four indexing plates are supplied as standard equipment to permit slitting various screw sizes.

Haller, Inc, 68½ Ann Arbor Rd, Plymouth, Mich

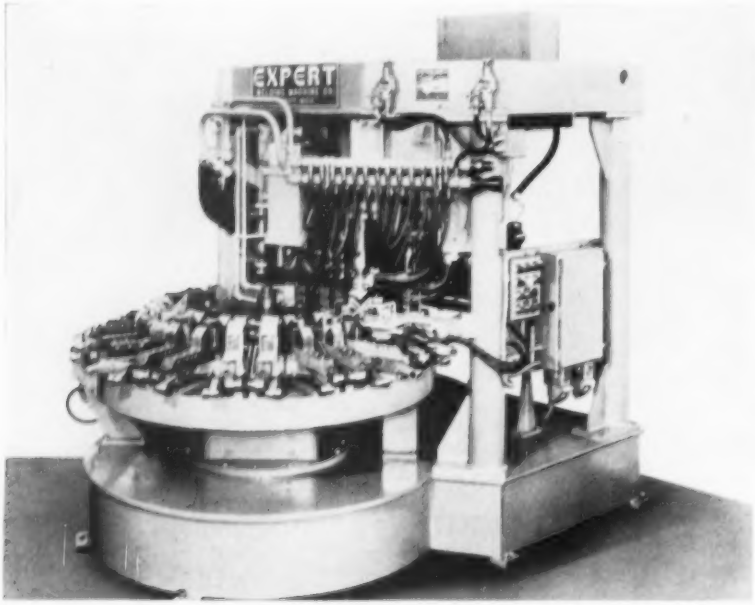
High-Speed Camera Takes 5000 Pictures per Second

Designated Fairchild Motion Analysis Camera, 16-mm instrument is available in an industrial model, now undergoing field testing, which is said to be capable of taking as many as 5000 pictures per second. Models for aviation and missile use are also being developed. Using daylight loading spools, models have film capacities of 100 and 200 feet. Metalworking applications include analysis of machine-tool motion, cutting-tool research, and transfer-mechanism operation.

Device differs from high-speed intermittent photography, in that rotating prisms are used. Special glass is used in the four-sided prism, which has a high index of refraction, low dispersion, and image production free from "color fringing." Prism shaft is so mounted that camera will operate at 55 "g's" without causing optical distortion or malfunction.

To give particular speed ranges, a family of interchangeable 28-v dc motors is used to drive the several models. Housings are heat-treated cast-aluminum alloy. Camera is reportedly easy to operate: there is only one switch; two sockets are provided for motor power and timing light.

Fairchild Camera & Instrument Corp, Robbins Lane, Syosset, LI, NY



Continuous Cam Drive Controls Index Welder Sequences

Twelve-station index welder features a continuous-running cam drive that controls index and weld sequences. Use of this type of drive is said to simplify sequence-timing functions, the welds being made when the 5-rpm cam is in dwell position.

Machine illustrated welds 1200 two-piece right- and left-hand automotive-hood hinge stampings per hour with nine spot welds. Both right-hand and left-hand parts are welded on the machine in adjacent fixtures on the 6-ft-dia index table. Parts are clamped in the 24 fixtures by stationary air-operated clamps at the welding stations. Both transformers and hydraulically powered welding guns for the four weld stations are suspended from an upper platform supported by four tubular-steel columns.

Because both right- and left-hand parts are welded on the machine, special air-operated ejector mechanisms are provided at separate stations to separate parts and deposit them on individual conveyors. A part detector mechanism checks each fixture for load condition at a station ahead of the weld stations and shuts off the machine if no part is in the fixture.

Machine occupies a floor space about 7 by 8 ft and is about 7 ft high. An integral motorized hydraulic pump and tank unit is supplied with the machine to provide hydraulic power for welding-gun operation.

Expert Welding Machine Co, 17144 Mt Elliott Ave, Detroit 12, Mich

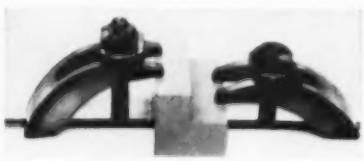
Automatic-Travel Torch

Model L-3 automatic-travel torch supplements previously announced Arcair torches, all of which are manual models, and is reported especially valuable on applications requiring long gouges, cuts, or bevels where there are no intricate configurations or complicated lines of travel. Torch is positively held and moved by a machine on a track; on circumferential seams it is held in a fixture while work is rotated.

Speed of travel can be predetermined and set at a constant rate. The only variable left to the operator is feeding the electrode into the work, which is done by racking the cylindrical tube which holds the electrode, as the electrode is consumed. It is here also that the depth of gouge is controlled.

Device requires only an electric arc and compressed air for operation. It is designed to take electrodes up to ⅜-in. diameter. A larger model, L-5, for electrodes up to ⅝ in., is also available.

Arcair Co, 419 S Mt Pleasant St, Lancaster, Ohio



Hold-Down Clamps Eliminate Shims, Vises on Many Jobs

Insta clamps eliminate need for shims as well as for vises on many jobs. Units will hold on to narrow grooves, ledges, or corners. Two or more lock work of any shape in position.

Clamps are heavy-duty steel forgings, furnished with concave, forged steel washers. Price, $7.50 per pair FOB.

Bausch Products, 18411 W McNichols, Detroit 19, Mich

Titanium Plating Process Overcomes Galling Problems

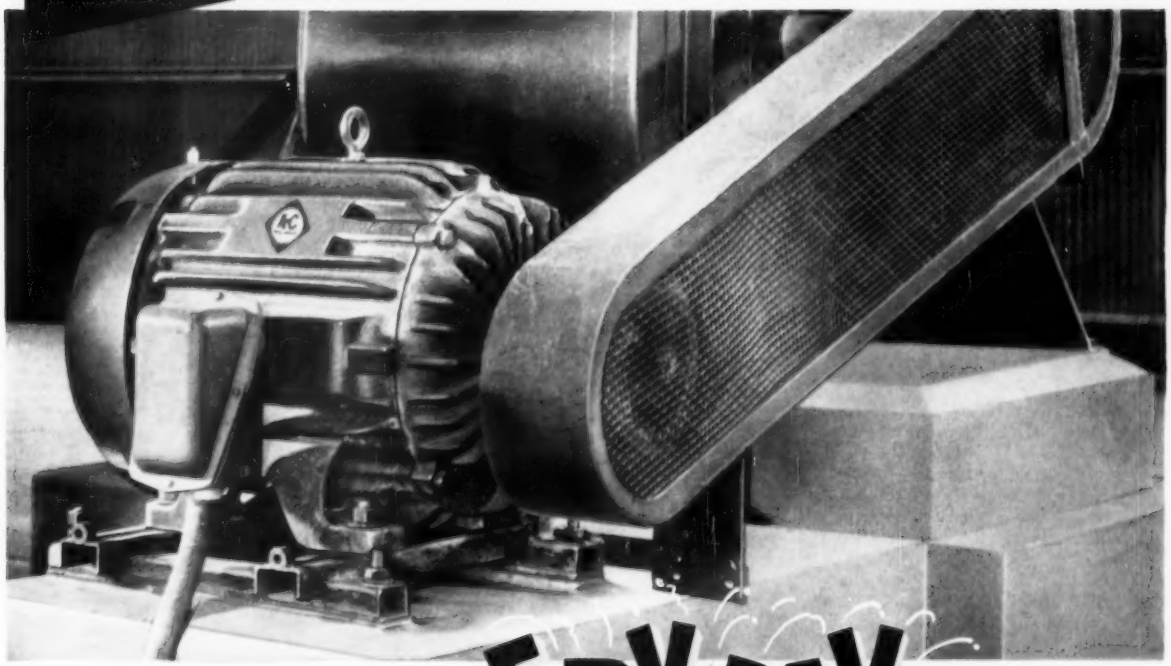
The rather poor performance of titanium and its alloys with respect to galling with motion under load is reportedly overcome by a process whereby a very adherent plating may be deposited upon the metal. Process in general consists of a first coating, upon which nickel may then be electro-deposited in the usual manner and finally plated with a suitable metal such as chromium.

Company reports that tests so far indicate that chrome plating applied by this process produces a plate which is as adherent as that normally produced on any other metal. The method is expected to expand greatly the possible applications for lightweight, high-strength titanium, as in use of shear pins where motion exists or in aircraft landing gears, where titanium will gall where motion exists unless the surface has been treated.

Company invites prospective users to submit specific problems.

Cleveland Pneumatic Tool Co, 3781 E 77th St, Cleveland 5, Ohio

There's **MORE** Cooling Surface in these deep-ribbed **MOTORS**



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AUTOMOTIVE . . . New Danly Underdrives form the car bodies of tomorrow—at lower cost for a highly competitive market.

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presses produce more

With Competition at an All-Time High, Successful Production Programs Are Being Built Around the Cost-Saving Advantages of Danly Presses

There are three basic reasons why leading industries invest millions of dollars each year in Danly Presses: 1) Engineering leadership, 2) Performance, 3) Dependability.

Engineering leadership—In new mechanical features, in safety, in operating efficiency . . . Danly has set the engineering pace. Every Danly Press is designed to meet specific, current production needs.

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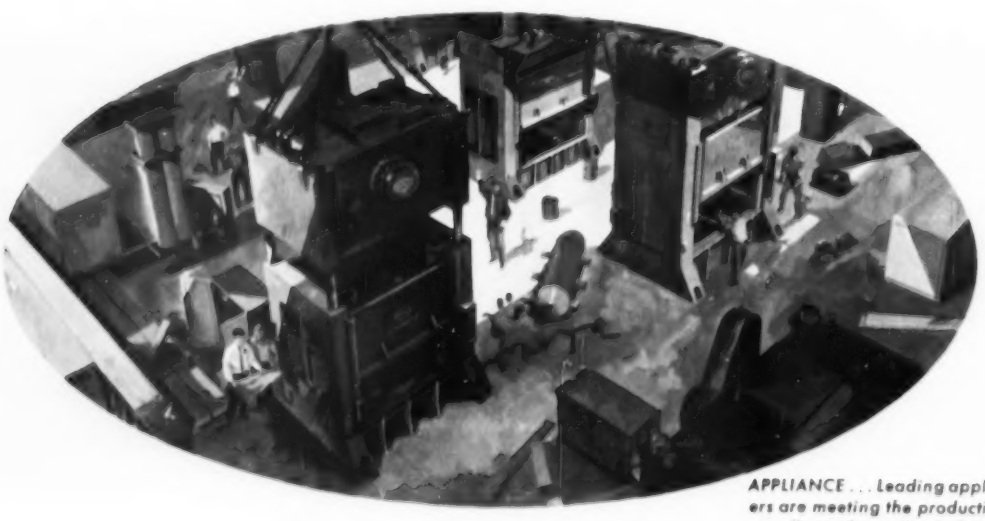
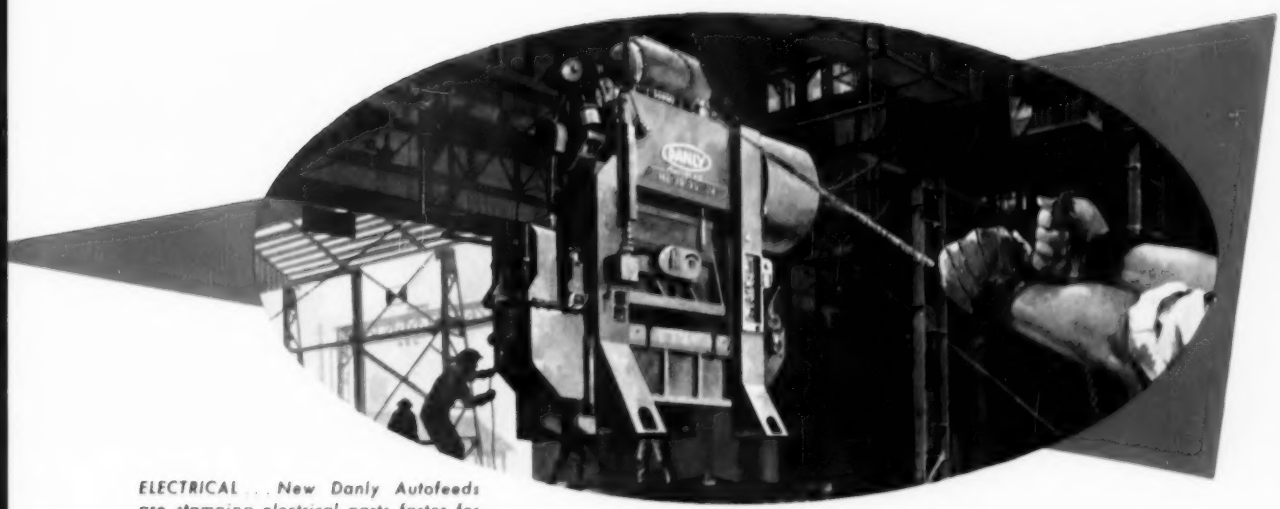
Dependability—Danly engineering and construction pays off in more stampings over a longer period of time. Performance records in the largest shops prove that Danly Presses require less maintenance, greatly reduce need for spare parts.



APPLIANCE . . . Leading appliance manufacturers are meeting the production challenge with new lines of new Danly Straight Side Presses.

in every industry



ELECTRICAL . . . New Danly Autofeeds are stamping electrical parts faster for less—with longer die life.

. . . at lower cost

Send for these Danly Catalogs . . .

They Hold the Answer to Modern Mass-Production Stamping Problems

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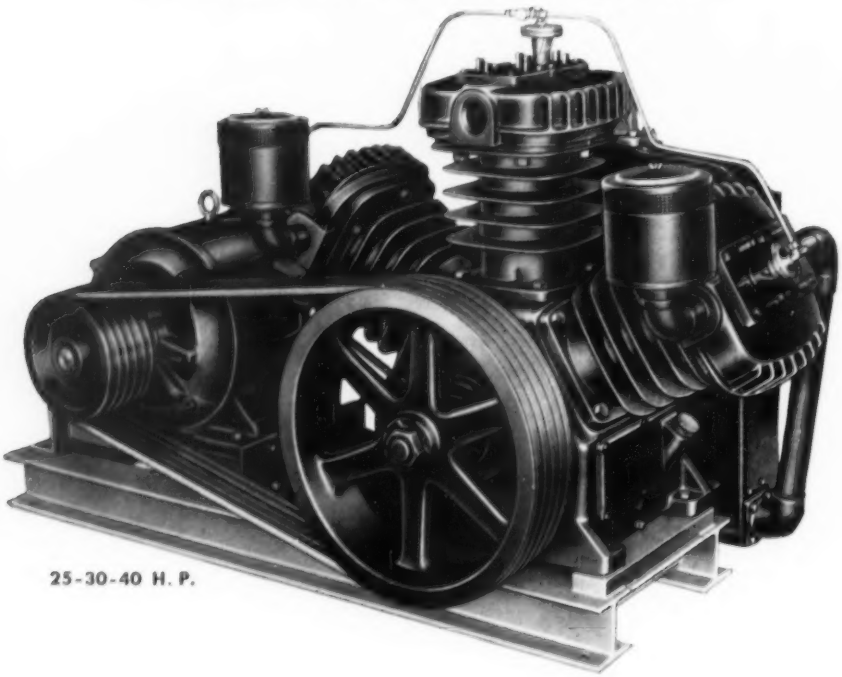
Provides Higher Operating Efficiency Costs Less to Install



25-30-40 H. P.

THIS NEW Curtis Two-Stage will deliver more air per minute, per horsepower and per kilowatt hour of electrical energy consumed, thus assuring a saving in your electrical bill.

It's Air Cooled, thereby eliminating expensive water bills and assuring quick and easy installation with no complicated plumbing problems.

The new C-100 embodies all the well-known Curtis engineering features such as centro-ring oiling and Timken Main Bearings.

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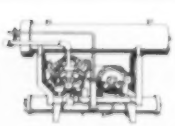
CM-24

AIR HOISTS
AIR CYLINDERS



PACKAGED LIQUID CHILLERS

AUTOMOTIVE AIR COMPRESSORS

AUTO LIFTS

PACKAGED AND REMOTE AIR CONDITIONING

FYI
FOR YOUR INFORMATION

FREE Catalogs, Booklets, Charts, Calculators

FYI – these initials symbolize information that's important. And there is much of importance in the literature listed here. To get the ones you need, all you do is fill out one coupon for each booklet you wish to order. Indicate in the circle on the coupon the number of one catalog wanted. When you have filled out a card, detach, stamp, and mail. We'll do the rest.

MACHINES AND ATTACHMENTS

1 LATHES & SHAPERS—*Logan Engineering Co, Chicago 30, Ill.* 24-page catalog contains illustrated descriptions of 66 models of screw cutting and turret lathes including cabinet, pedestal base, floor, and bench units. Specifications and details given on line of Logan 8-in. shapers. 8-page accessory section illustrates and describes attachments and accessory equipment for both.

2 INDEX TABLES & ROTARY TRANSFER MACHINES — *Ferguson Machine & Tool Co, St Louis 21, Mo.* 24-page catalog 301 gives load ratings and dimensions of 150 standard high-speed Intermittor tables including dial sizes from 12 to 120 in. with from 4 to 36 stations, production speeds up to 30,000 pieces per hr. Standard power assemblies, stands, and control panels described for forming complete rotary transfer machine for automatic assembly.

3 DEBURRING MACHINES—*Modern Industrial Engineering Co, Detroit 38, Mich.* 4-page illustrated bulletin BB-1 describes Burr-Blast machines for removal of fragmentary burrs from finish machined cast iron or nonferrous parts. Three basic designs covered; various blasting materials described.

TOOLS AND ACCESSORIES

4 HOLE PUNCHING & NOTCHING EQUIPMENT — *Punch Products Corp, Niagara Falls, NY.* 48-page catalog describes and illustrates Unipunch Series A and B hole-punching units; Uninotch Series A and B notching units; Unipunch Series AE hole-punching units; and Unipunch Series C hole-punching units. Dimensions, specifications, price and parts lists, engineering data included.

5 CARBIDE DIES—*Oberg Manufacturing Co, Tarentum, Penna.* 48-page booklet contains illustrated information on engineering service consisting of study of production problem, design and building of the die, construction of auxiliary tooling, and production proving before shipment. Data included on lubrication, blanking and stripping pressures, sharpening-wheel selection, maintenance, carbide characteristics.

6 TOOLHOLDERS & CARBIDE INSERTS—*Vascoloy-Ramet Corp, Waukegan, Ill.* 24-page catalog VR-437 contains illustrated descriptions of positive and negative rake toolholders for throw-away inserts, and negative rake holders for standard inserts up to 1½ in. long. Dimensions, prices, ordering information; recommendations covering carbide grades for various machining operations on different materials included.

7 TOOLS—*Albertson & Co, Sioux City, Iowa.* 52-page illustrated catalog 56 describes Sioux valve face grinding machines, valve seat grinder sets, electric screwdrivers, impact wrenches, drills, bench and portable grinders, flexible shafts, saws, sanders, polishers, abrasive disks, and polishers.

8 ABRASIVE DISKS — *Gardner Machine Co, Beloit, Wis.* 14-page Gardner Grinder booklet contains illustrated discussion of selection factors; design features; grains, grades, and bonds; applications.

9 LUBRICATION GUIDE—*Waterbury Farrel Foundry & Machine Co, Waterbury, Conn.* 20-page illustrated guide covers lubrication systems and requirements for all WF machinery. Systems include circulation oiling, centralized pressure lubrication, bath-splash oiling, centralized gravity feed, and hydraulic. Discusses lubricant physical properties; effects of temperature, water, acids, air; chart lists materials recommended for each system.

10 CARBIDE-TIPPED GUN DRILLS—*Chicago-Latrobe, Chicago 10, Ill.* Illustrated folder gives data on applications, advantages, suggested speeds and feeds for use with different materials, specifications.

11 ADJUSTABLE PERFORATING DIES—*S B Whistler & Sons, Inc, Buffalo 23, NY.* 24-page catalog 55 illustrates and describes sizes, shapes, and applications of units for perforating materials up to and including ⅛-in. mild steel, 3/16-in. aluminum. Engineering data, accessories, special equipment, punching pressure chart included.

12 PRODUCTION HOLDING TOOLS—*Seibert & Sons, Inc, Chenoa, Ill.* 6-page illustrated circular describes slip spindle assemblies, drill and tap drivers, spindle extension assemblies, adapters, and turret toolholders.

Name .....
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Co. Address .....
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Place 3¢ Stamp Here

Reader Service Department
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FYI
FOR YOUR INFORMATION

13 MINIATURE PANEL INSTRUMENTS & ACCESSORIES—*General Electric Co, Schenectady 5, NY.* 12-page bulletin GEC-368H gives information on features, applications, construction, dimensions of 2½, 3½, and 4½-in. sizes.

HEAT TREATING AND WELDING

14 WELDIRECTORY — *Lincoln Electric Co, Cleveland 17, Ohio.* 28-page illustrated "Weldirectory for Mild Steel and Low-Alloy High-Tensile Steels" (SB-1351) has been revised to include newest iron powder and other electrodes. Bulletin provides description of each electrode, physical properties and chemical composition, recommended welding procedures, operator's reference table, and list of typical applications for each.

15 "RECOMMENDED PRACTICE FOR WELDING OF STEEL CASTINGS"—*Tempil Corp, New York 11, NY.* 40-page manual published by the Steel Founders Society of America covers methods; classification of electrodes; procedure for welding carbon-steel and low-alloy steel castings.

16 WELDING MACHINERY — *Acro Welder Mfg Co, Milwaukee 3, Wis.* 12-page illustrated bulletin 156 describes line of specially engineered and standard resistance and arc welding equipment.

17 ROTARY-HEARTH ELECTRIC FURNACES—*General Electric Co, Schenectady 5, NY.* 4-page bulletin GEA-4075A gives features, cross-section diagram, applications, and dimensions of units with max operating temperatures of 1800 and 2500 F. Furnaces are recommended for heat-treating parts that are to be fixture quenched or individually handled.

PLANT SERVICE EQUIPMENT

18 DIESEL-POWERED LIFT TRUCKS —*Hyster Co, Portland, Ore.* Descriptive literature illustrates and gives specifications of models furnished with diesel engines. 4-cylinder units are available for trucks of 6000 and 8000-lb capacity; 6-cylinder for 15,000 to 20,000-lb trucks; and 4-cylinder for 3000, 4000, and 5000-lb models.

19 UNIT HEATERS — *American Air Filter Co, Louisville, Ky.* 36-page illustrated bulletin 709A lists improvements, specifications, and performance data for horizontal and vertical heaters. Technical data includes hot water and steam tables, dimensions, selections, applications, components and accessories.

20 STEEL STRAPPING — *Acme Steel Products Div, Acme Steel Co, Chicago 8, Ill.* 44-page catalog contains illustrated description of five basic applications including reinforcing, palletizing and skidding, bundling, baling, and tying. Tools and equipment covered.

21 PAINTING EQUIPMENT—*DeVilbiss Co, Toledo 1, Ohio.* 8-page booklet discusses Hot Spray Method; process described, advantages outlined; installations illustrated. 4-page bulletin contains illustrated information on paint heaters. 8-page bulletin pictures and describes large capacity paint pump for production finishing, maintenance painting, and coating operations.

22 NEOPRENE BELTING — *General Rubber Corp, Tenafly, NJ.* 4-page illustrated bulletin 561 discusses features of material available in four styles: Custom, Sani-Flex, Multi-Duty, and Rufftop, in widths, lengths, and thicknesses to meet any light-duty horizontal or inclined conveying, elevating, and power transmission operations.

● CENTRIFUGAL FANS—*Trane Co, La Crosse, Wis.* Bulletin DS-348B, covering units with backwardly inclined blades, and DS-348F, forward curved blades, have been revised to include new features and data on line of Class I and Class II fans in wheel diameter sizes 12 through 80 in. Request direct on company letterhead.

23 CABLE CONVEYOR SYSTEM — *Tipp Manufacturing Co, Tipp City, Ohio.* 36-page illustrated engineering manual gives detailed information for ordering and installing, including diagrammatic plan for layout and dimensional calculations. Tipp-Tronic automatic safety controller and other features described.

PARTS AND MATERIALS

● MECHANICAL POWER TRANSMISSION PRODUCTS — *Dodge Manufacturing Corp, Mishawaka, Ind.* 328-page engineering catalog covering complete line includes sectional drawings, dimensions, weights, prices, application details, tabular data. Includes 8-page detailed index. Request direct on company letterhead.

24 BERYLLIUM COPPER CASTING ALLOYS—*Beryllium Corp, Reading, Penna.* 12-page catalog covers complete range of Berylco products. Describes available alloys, properties, advantages, casting and processing techniques. Includes data on machining, tool and cutting rates, cutting fluids, heat-treating, and surface finishing.

25 SPEED REDUCERS — *Cone-Drive Gears, Division of Michigan Tool Co, Detroit 12, Mich.* 8-page bulletin 600-C illustrates and describes improved features of double-enveloping worm gear units. New specifications and hp ratings for models from 2 through 6-in. center distance for loads to 60 hp.

26 MAGNETIC MOTOR STARTER — *Cutler-Hammer, Inc, Milwaukee 1, Wis.* 4-page booklet EE-191 illustrates features of Bulletin 9586 ac unit with improved pressure terminals, visual or audible alarm circuit, plastic-covered coil insulation.

27 TITANIUM CORROSION RESISTANCE — *Mallory-Sharon Titanium Corp, Niles, Ohio.* 8-page bulletin describes various uses of titanium based on its corrosion resistance; contains corrosion rating table for exposure to many common types of agents.

28 POWER TRANSMISSION EQUIPMENT—*Lovejoy Flexible Coupling Co, Chicago 44, Ill.* 12-page illustrated technical brochure gives information on full line including flexible couplings, variable speed pulleys and transmissions, universal joints, and motor bases. Includes operating data, hp ratings, sizes and types available.

29 MINIATURE FLEXIBLE COUPLINGS—*Thomas Flexible Coupling Co, Warren, Penna.* 4-page bulletin pictures, describes, and shows dimensional drawings of standard and special units for power transmission. Includes specifications, dimensions, bore size, and list prices.

Continued on page 210

INSTALL WIREWAYS FASTER!

SQUARE D's NEW AND EXCLUSIVE *Lay-in Duct*

FASTER ASSEMBLY!
LESS NUTS AND BOLTS
FASTER WIRING!
NO MORE THREADING OR PULLING OF CONDUCTORS...JUST LAY THEM IN
FASTER HANGING!
UNIVERSAL TYPE HANGERS
FASTER GANGING!
KNOCKOUTS MATCH THOSE ON RELATED SQUARE D EQUIPMENT. NO CONDUIT BENDING

Square D's exclusive design provides hinged covers for both the duct sections and connectors. Easily removable fitting covers then provide a completely unobstructed wireway in which to lay wires.

LAY-IN DUCT is available in 2½" x 2½", 4" x 4", and 6" x 6" sizes, in standard lengths of 1, 2, and 5 feet. There is a complete line of fittings, all with the "lay-in" design feature.

• • •

Write for the complete story of LAY-IN DUCT—how it gives you a better wireway system, easier, faster and at less cost. Address Square D Company, 6060 Rivard Street, Detroit 11, Michigan.

NOW...EC&M PRODUCTS ARE A PART OF THE SQUARE D LINE!

SQUARE D COMPANY

Hammond Carbide Tool Grinder Has Oscillating Spindle

Model OCE-6 carbide tool grinder features an oscillating spindle which relieves operator of the effort of manipulating the tool. Tool is held in a stationary position while spindle does work. Grinder can be adapted for conventional grinding or connected to a power pack for electrolytic grinding.

Wheel oscillation has two variables: oscillations per minute and length of stroke. Both are controlled by handwheels located on the front of the machine. Oscillations can be adjusted between 0 and 70 per min, and length of stroke can be varied to accommodate tools from ¼- to 2-in.-face, using a ¾-in.-face diamond wheel.

V-belt drive is from a 1 hp motor. Self-contained unit accommodating either conventional coolant or electrolytic solution is mounted inside the base.

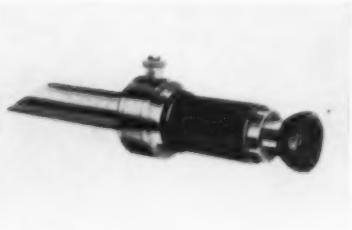
Hammond Machinery Builders, Inc, 1618 Douglas Ave, Kalamazoo, Mich

Tube Reamer Gun Drill

Drill is said to be particularly adaptable to valve-guide-hole drilling, and other work where hole size, roundness, and straightness must be held to strict specifications.

Unit, two-thirds cylindrical in shape, is an end cutting tool with a single cutting edge; it cuts a true round hole while rotating in the work. Oil is pressurized through the shank down to the cutting edge. Acting both as a coolant and lubricant, it forces chips out through the single flute without retraction. Secondary operations can reportedly be eliminated entirely with proper setup, maintenance, and careful regulation of speeds and feeds. Micro finish of from 20 to 100 is said to be possible, depending on requirements. Drills are available in varied sizes and diameters.

Eldorado Tool & Manufacturing Co, 342 Boston Post Rd, Milford, Conn



Large-Cavity Inspector

Model TG-5 Borescope, produced in Germany by Zeiss, is designed for the examination of large cavities such as the inside walls of tubes, cylinders, boilers, and other hollow bodies of various shapes. Instrument models range from ½ to 1¾ in. in diameter and from 20 to 72 ft in length.

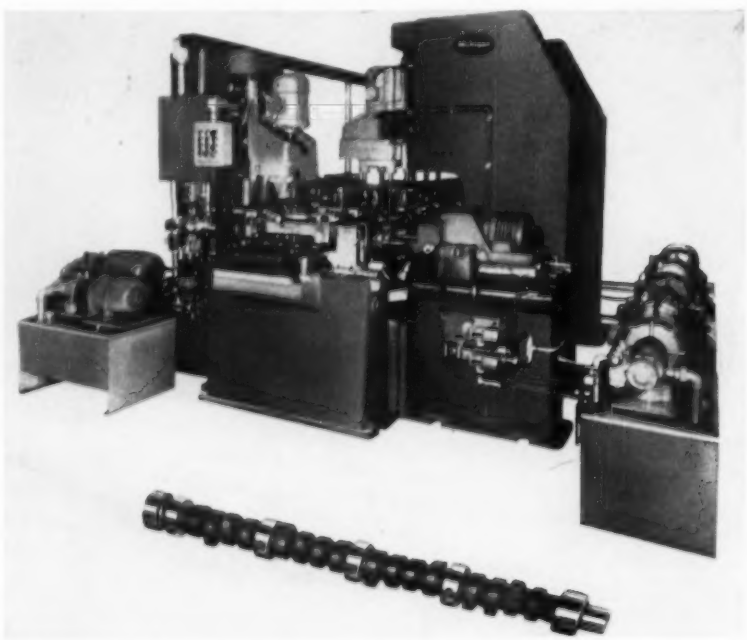
Optical system is reported to be of such quality as to permit critical examination of interior surfaces without distortion or aberrations. A variety of detachable objective viewing heads, which thread to the objective tube, enable the observer to obtain forward, rear, lateral, oblique, and wide-angle views. Each instrument embodies an illuminating system with a lamp in the objective attachment.

Special photographic attachment can be fitted to the eyepiece for taking pictures.

Imported by Kollmorgen Optical Corp, 30 Church St, New York 7, NY

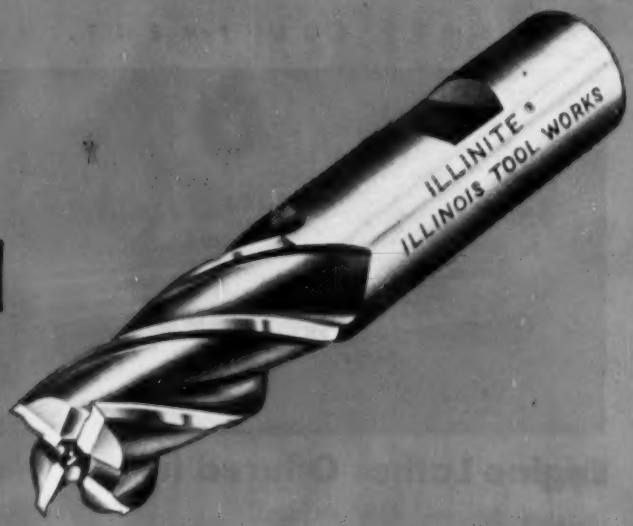
Vinyl-covered wire, ranging in sizes from 15 gage and finer, is available in all standard colors. Flexible product can be rolled or twisted to any shape desired.

Wilson Steel & Wire Co, 49th St and South Western Ave, Chicago 9, Ill



AUTOMOTIVE CAMSHAFTS are machined on special transfer machine with twelve stations built around standard components. All components as well as the transfer, locating, and clamping mechanisms are hydraulically operated and electrically controlled. Part arrives at machine with bearings and journal roughturned and the ends faced and centered. Operations on machine include drilling, reaming, milling, tapping, and chamfering. Estimated production at 80% efficiency is about 151 pieces per hour—*Michigan Drill Head Co, P O Box 4643, Detroit 34, Mich*

NOW...two end tooth styles!



ILLINITE®

MULTIPLE-FLUTE END MILLS

Illinite Multiple-Flute End Mills offer you your choice of two end tooth styles. Both cupped-end tooth and full-end tooth designs are available in a wide range of sizes. Products of Illinois Tool Works, end mills marked "ILLINITE" are your assurance of the finest in metallurgy, design, and precision craftsmanship. They're in stock, no farther away than your telephone.

CALL YOUR ILLINITE DISTRIBUTOR TODAY!

He carries the complete line of Illinite End Mills for every end-milling requirement.

NOW!

...Special Multiple Thread Milling Cutters available through your local Illinite Distributor.

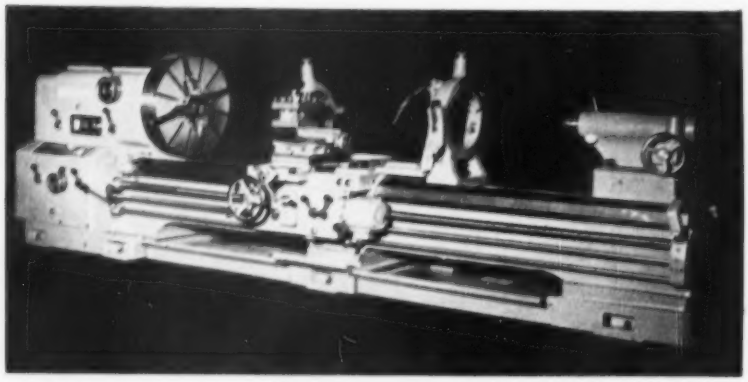
THE QUALITY LINE FROM...

ILLINOIS TOOL WORKS

2501 N. Keeler Avenue
Chicago 39, Illinois

ILLINITE...the most complete line of Standard Metal Cutting Tools—available from stock!

TRI-MILS • END MILLS • MILLING CUTTERS
SLITTING SAWS • KEYSLOT CUTTERS • HOBS
SHAPER CUTTERS • TOOL BITS



Engine Lathes Offered in Four Models

Designed for use with standard, tungsten-carbide, and ceramic tools, Morando engine lathes, imported from Italy, are available in four models and eleven sizes ranging from 18-in. swing and 10 hp to 55-in. swing and 52 hp. All models have 24 speeds in geometrical progression. Standard speeds range from 12 to 1200 rpm, with 24 speeds in the high-speed range from 15 to 1500 rpm.

Spindles are mounted on preloaded, front-and-center Timken bearings. Cylindrical roller bearing is mounted on the rear to allow for heat and friction expansion. Two Timken bearings surround the bull gear adjacent to the spindle nose to eliminate deflection.

Special U ribs on the extra-wide bed supply the strength characteristic of a box-section and diagonal-rib setup. Bed is available on request with gap and removable bridge for large workpieces. Ways are of hardened and ground Meehanite heat-treated to a hardness of 45-50 Rc.

Hardened, precision - ground, chrome-nickel-alloy steel gears are used in the headstock. All gear boxes are totally enclosed and automatically lubricated. Apron has its own lubricating system for gears, shafts, and carriage slides.

Imported by Maserati Corp of America, 662 Main St, Westbury, LI, NY

Combined Level and Angle Finder

Dual-purpose device gives exact measurements of angles of work in progress on grinders, drillpresses, shapers, and similar machine tools.

Aluminum case has Plexiglas face and tube. Pocket-size unit is shockproof, dust-proof, anti-magnetic, unaffected by temperature changes. Price is $47.50 FOB Detroit.

Jiffy Tool Supply Co, 109 E 9 Mile Rd, Ferndale, Mich

Straight-Side Mechanical Presses

Two-point enclosed presses with cast Meehanite frames are offered in capacities ranging from 150 to 750 tons. All air and electrical lines needed for auxiliary equipment are built into the massive uprights, and doors and covers which provide access to electric, air, oil, and other systems are flush mounted.

Left-to-right gear drive utilizes twin intermediate shafts which permit mounting the flywheel, clutch, and motor drive in between. This arrangement makes a compact system housed within a box crown that is symmetrical right to left and front to back.

Other features include built-in lights over die area and automatic oil lubrication. Bliss automation control, consisting of an electromechanical rotary switch, is used.

200-ton press illustrated operates at 20 spm. Slide stroke is 16 in., slide adjustment is 12 in., and shut height on bed is 32 in. Bed area is 84 x 48 in.

E W Bliss Co, Canton, Ohio

Schmidt Machine Marks End Caps Automatically

Model 175-30T marking machine, equipped with vibratory feed, is designed for the marking of end caps. Rated production is 1600 per hour.

Hopper has a diameter of 36 in. and will hold enough parts for a 30-min run. Parts are oriented by means of fingers, with a final 180° turn in the chute to the machine.

Marking tool which mounts in the machine head consists of a radial-type unit with logotype holder to permit variations in marking. Several holders are used with sufficient type and logotype, so that setups for subsequent runs can be made while machine is in operation.

Geo T Schmidt, Inc, 4100 Ravenswood Ave, Chicago 13, Ill

Phaostron Instrument Protects Against Overloads, Burnouts

Volt-Ohm-Milliammeter Model 666 is fused to prevent burn-outs and instrument damage through misapplications, and has overload protection for meter movement. Instrument features only two jacks for all measurements, separate range and function switches, and an insulated zero adjustment. Unit measures dc volts from 1.5 to 1500 v at 20,000 ohms per volt; ac volts from 1.5 to 1500 v at 2000 ohms per volt; dc current from 50 ua to 15 amps; ac current from 1.5 ma to 15 amps; decibels from −10 to +50; and resistance from 0.25 ohms to 10 megohms.

Phaostron Instrument and Electronic Co, 151 Pasadena Ave, South Pasadena, Calif

118 feet of automation—

performs machine operations on bank surfaces, valve lifter holes and distributor hole of V-8 engine block.

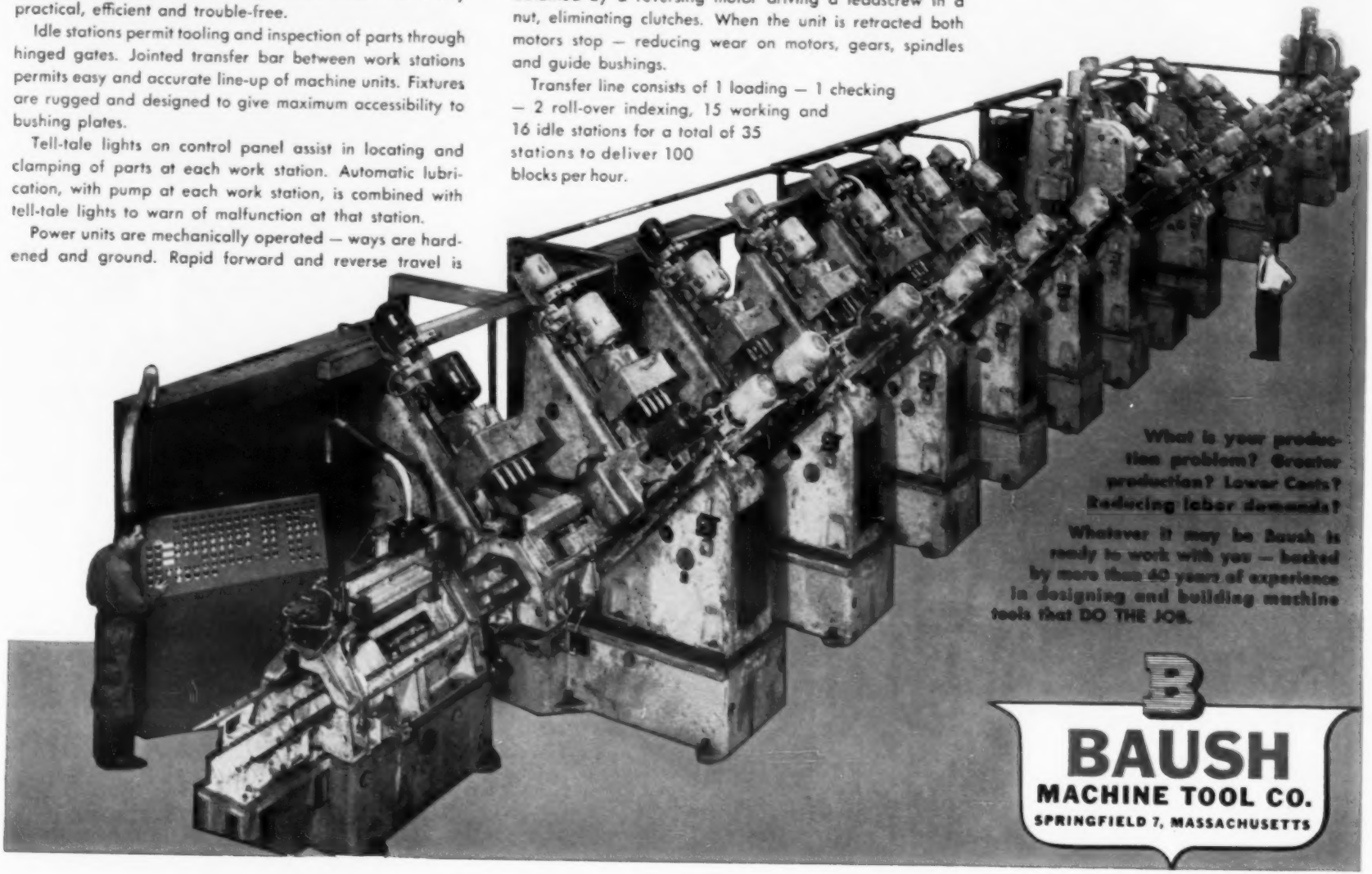
Outstanding features in this long transfer make it extremely practical, efficient and trouble-free.

Idle stations permit tooling and inspection of parts through hinged gates. Jointed transfer bar between work stations permits easy and accurate line-up of machine units. Fixtures are rugged and designed to give maximum accessibility to bushing plates.

Tell-tale lights on control panel assist in locating and clamping of parts at each work station. Automatic lubrication, with pump at each work station, is combined with tell-tale lights to warn of malfunction at that station.

Power units are mechanically operated — ways are hardened and ground. Rapid forward and reverse travel is obtained by a reversing motor driving a leadscrew in a nut, eliminating clutches. When the unit is retracted both motors stop — reducing wear on motors, gears, spindles and guide bushings.

Transfer line consists of 1 loading — 1 checking — 2 roll-over indexing, 15 working and 16 idle stations for a total of 35 stations to deliver 100 blocks per hour.



What is your production problem? Greater production? Lower Costs? Reducing labor demands?

Whatever it may be Baush is ready to work with you — backed by more than 40 years of experience in designing and building machine tools that DO THE JOB.

BAUSH
MACHINE TOOL CO.
SPRINGFIELD 7, MASSACHUSETTS

Hydraulic Crane Scales

Heavy-duty crane scales in the Hydroscale line include 110 models with capacities from 500 to 200,000 lb. Device is hung on crane hook or hoist, so that when load is lifted it is automatically weighed. Lifting eyes on smaller models (up to 4000 lb) fit on any standard 5-ton hooks. Lifting eyes on models of greater capacity fit any standard hook.

All models are provided with tare-adjusting knobs, so that the net load reading can be readily obtained. Dials are available in sizes of 12, 24, and 30 in. diameter, protected by tempered safety-glass. All scales are guaranteed to be accurate to 0.5% for one year.

Hydroway Scales, Inc., 20624 West 8 Mile Rd., Detroit 19, Mich

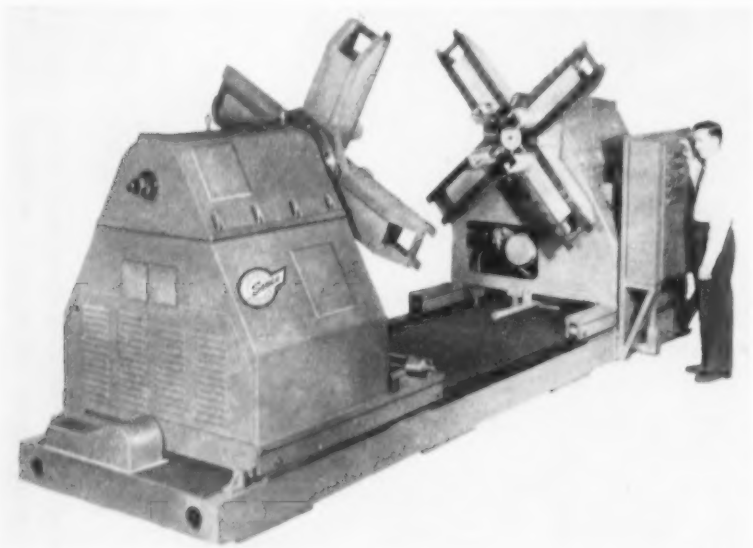
Sheffield Instrument Combines Hardness Tester and Microscope

Combination micro-hardness tester and metallurgical microscope, of non-destructive type and with a load-weight range of from 25 to 1000 grams, requires only one minute for a complete test cycle. Interchangeable vise accessories permit instrument to be used for testing small precision-ground or lapped parts, small-diameter wires, very thin materials, thin sheet stock, cutting-tool edges, and ball bearings.

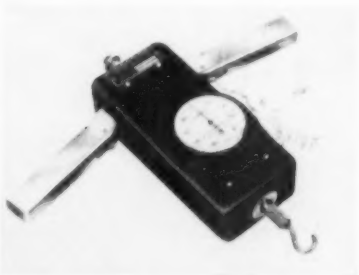
Vertical capacity is 2⅜ in., and maximum spread of standard vise jaws is 1 11/16 in. Surface finishes of 40 rms or less can be inspected, and indentations of 0.0004 in. or smaller can be measured to an accuracy of 0.00008 in. Spot to be indented can be located to within 0.0002 in. Green light in instrument head shows when the indenter is in contact with the work, and a red light indicates when the load cycle is complete.

When the instrument is used as a metallurgical microscope, interchangeable objective lenses provide magnifications of 200X and 400X. Camera can be attached to the eyepiece for making photomicrographs.

Sheffield Corp, Dayton 1, Ohio



COIL HANDLER called "Twin-in-Action" can be built to customer specifications, and will handle coil weights up to 40,000 lb. Unit is built of standard components and is power driven. Coil is picked up on the ID by four radially contoured, power-driven expander arms. Each of the two reels can be laterally adjusted, independent of the other or in unison. Uncoiling of stock is started by pressing button at control center. Stock flow is controlled by loop control which governs pay-off. Either steel or aluminum stock can be handled — *Sesco Inc, 8881 Central Ave, Detroit 4, Mich*



Direct-Reading Force Indicators Extend Hunter Line

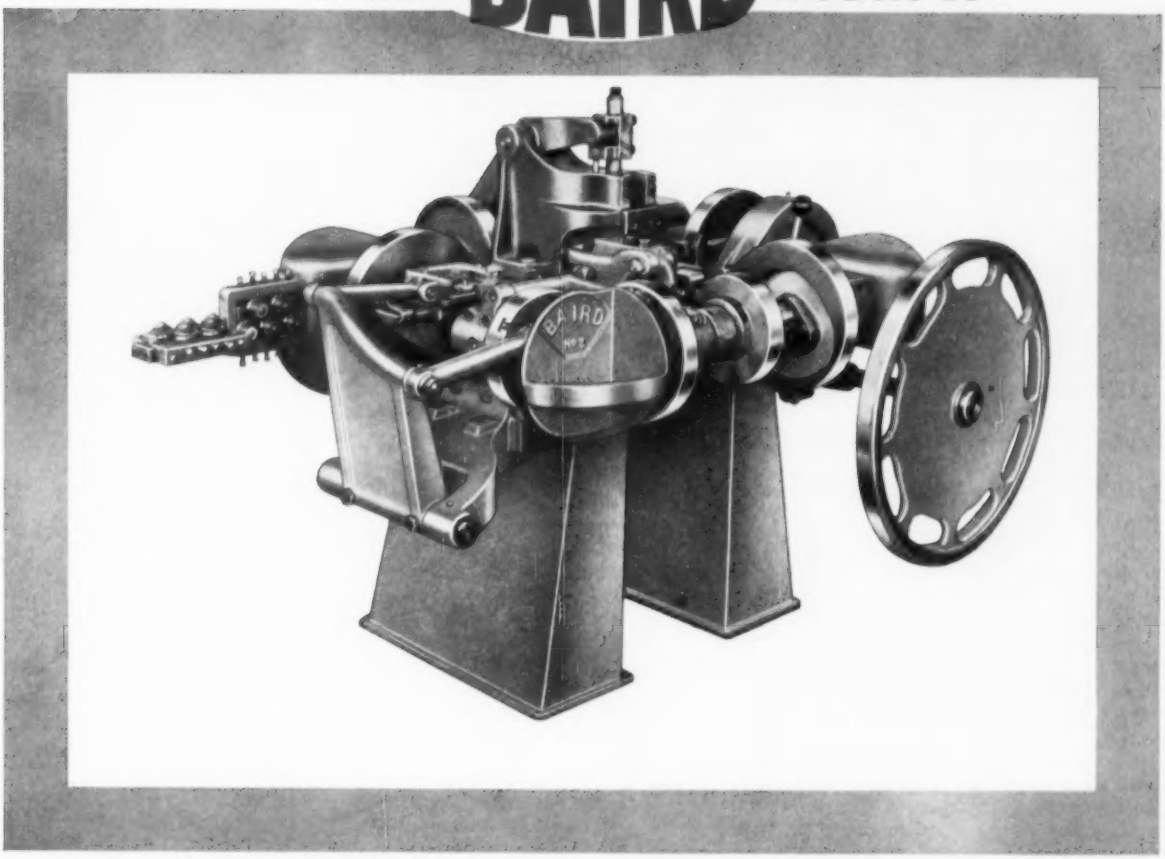
Series of precision force indicators with capacities of 50, 75, 100, 150, and 200 lb are available in three models which extend to eighteen the number of indicators offered by company. Called Series D, indicators measure all forces up to their maximum capacities, with accuracies of ¼ lb for the 50-lb model, ½ lb for 75- and 100-lb models, and 1 lb for 150- and 200-lb models.

Equipped with compression head and hook, both of which can be removed for substitution of special fittings, units are constructed of cold-rolled steel. Detachable handles latch easily into position, and three threaded holes are provided in back of case for mounting in special test set-ups.

Instruments use compensated spring mechanisms, in which gradients are as small as 0.1%, and fully jeweled dial indicators. Each dial has 100 dial divisions.

Hunter Spring Co, Engineering Dept, Lansdale, Penna

...ask BAIRD about it



The "hidden bargain" in a BAIRD Four-Slide

Thousands of Baird Four-Slide users . . . making everything from auto seat springs to bobby pins . . . say it isn't hard to find.

The "hidden bargain" is the cost-reduction know-how that goes along with every machine sold.

Baird pioneered the four-slide machine as the basic round and ribbon wire forming equipment used by every industry making such products. Baird has the most extensive experience files on tooling for this most versatile of high production equipment. Usually the problem that seems tough to the customer can be matched to a previous successful Baird application . . . thereby saving time and money in tooling.

With such a reservoir of past practical experience to draw upon, it's always good business to "ask Baird about it" when a four-slide application is being considered. Our range of standard automatic wire forming machines is complete, from the "bench top" No. 00 (400 lbs.) to the "room size" No. 8 (12,000 lbs.) . . . also two standard sizes of ribbon metal forming machines. Bulletin on request. Write Dept. A.M.

AUTOMATIC WIRE FORMING TOOLS • AUTOMATIC WIRE & RIBBON METAL FORMING MACHINES — AUTOMATIC WIRE & RIBBON METAL FORMING SHAPES

THE BAIRD MACHINE COMPANY

STRATFORD CONNECTICUT

18A56

Metco Gun Sprays Metal and Ceramic Coatings With Special Powders

Type P ThermoSpray gun applies coatings, without the use of compressed air, of stainless steel, bronze, and other metals; hard-facing alloys; and powdered ceramics like aluminum and zirconium. Maker claims that deposit efficiencies are better than 95% and that deposit rates are much faster than those obtained with other guns.

Special powders developed for use with gun are held in a reservoir atop the gun (or in a separate hopper, from which they are fed to the gun through a hose). Powders are fed through an abrasion-resistant connector into the gun proper, where they are picked up by gas flow and fed to the gun nozzle. Two hoses attached to rear of gun carry oxygen and either acetylene or hydrogen.

Self-fluxing alloys used for hard-facing may be left in the "as sprayed" condition, semi-fused or completely fused to the base material. Stainless steel and bronze are used "as sprayed" and provide coatings similar in many respects to those obtained with wire-type metallizing guns. Hard-facing deposits have a hardness of from R_C 30 to R_C 65, depending on which of six available nickel-chromium-boron alloy powders is used. Amount of alloy applied can be closely controlled, and surface left after spraying is said to require a minimum of finishing compared to other methods of application.

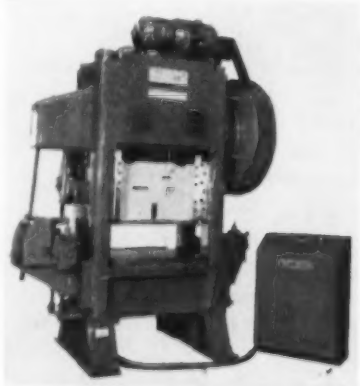
Metallizing Engineering Co, Inc, 1101 Prospect Ave, Westbury, LI, NY

Compact, Movable Coating Unit

Equipment for applying, curing, welding, repairing, and sparktesting Quelcor plastisols and rigid PVC is contained in a single unit.

Special cabinet is designed to accommodate dip materials, curing unit, welding, and testing equipment. Container of plastisol is stored on an adjustable bracket on the inside of the door. Cabinet is wired with switch and fuse box; outlets are provided for various appliances. Curing device consists of three infrared strip heaters, controlled by a common power in-put regulator. Parts can be preheated by placing over the base heater or rotated on the spindle. When proper temperature is obtained, part is dipped to desired thickness. Curing is accomplished in minutes on rotating spindle. Unit is furnished with three grades of plastisol and a primer.

Quelcor, Inc, Front & Broomall Sts, Chester, Penna



Press Bearing Construction Extends Die Life

75-ton straight-side Flexopress, shown with console-mounted controls, features anti-friction ball-bearing raceway construction said to extend die life up to four times the average. The slide, with four preloaded raceways operating in hardened-and-ground steel inserts, is reported to maintain vertical accuracy within 0.0005 in. and parallelism between slide face and bed within 0.0015 in.

High-speed operation of up to 370 spm is made possible by low ram inertia. Large working capacity is provided with 15-in. side opening accommodating work up to 14 in. wide. Automatic feed is infinitely adjustable up to 8 ips. Standard stroke is 2½ in.

Console control provides single stroke, continuous operation, inching, variable-top stop control, variable-sequence inch control, key locking, motor reverse, motor start, emergency stop, variable motor speed, key-locking stroke counter, and visible tachometer.

10-hp Louis-Allis Adjusto-Spede drive provides speeds ranging from 100 to 1675 rpm.

Precision Welder & Flexopress Corp, Cincinnati, Ohio

Black-Granite Surface Plates Have R_C 80 Hardness

Made exclusively from black granite, line of surface plates ranges from small toolmakers' flats of 8 x 12-in. size to one-piece layout tables 72 x 144 in. in area. Larger table areas can be obtained by joining several granite tables with special stands which are marketed by company. Tolerances for the over-all surface area of the plate are furnished by the company, rather than accuracy ratings for each unit of area within the total plate area.

A number of accessories are available, including black-granite straight edges, parallels, chuck platforms, and angle plates. These are intended for use either in checking steel and granite plates or for making setups to check dies, tools, and other parts.

DoAll Co, 254 N Laurel Ave, Des Plaines, Ill

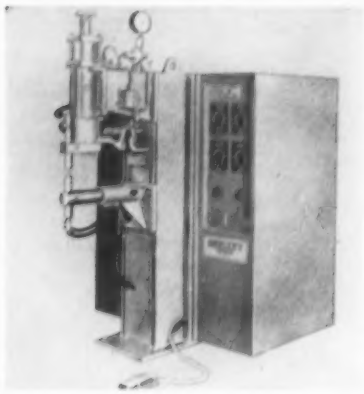
Universal Drill Bushings are available in a complete range of standard sizes and lengths. Special sizes made to order. Vastly increased production facilities assure immediate deliveries. Write to the office nearest you, Universal Engineering Sales Co., 1060 Broad St., Newark 2, N. J.; 5035 Sixth Ave., Kenosha, Wis.; or the home office.

Universal products include: Standard Collet Chucks, Floating Collet Chucks, Boring Chucks, "Kwik-Switch" Tool Holders, Mikro-Lok Boring Bars, Standard Drill Bushings, and Universal Index Plungers. Write for catalog.

189

UNIVERSAL ENGINEERING COMPANY

FRANKENMUTH 1, MICHIGAN

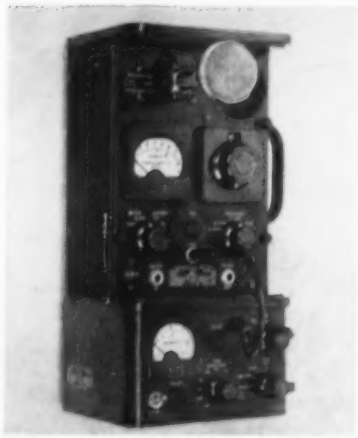


Spot and Projection Welders Handle Wide Range of Metals

Air-operated Model SPT-1 spot welder (illustrated) and EPT-1 projection welder are No. 1 of a series in sizes ranging from 1 through 5. Machines are available in 40- and 75-kva rating at 50% duty cycle. SPT-1 throat depths are 18, 24, 30, 36, and 42 in., while for EPT-1 they are 12, 18, 24, and 30 in. Shortest throat depth of both machine types will accommodate a maximum electrode force of 1575 lb at 80-lb gage.

Machines reportedly will weld a wide range of mild steel, stainless steel, aluminum, and other light alloys. Welding current is Sciaky Three-Phase, which eliminates current compensators required with conventional single-phase. Machines are fully automatic.

Sciaky Bros, Inc, 4915 W 67th St, Chicago, Ill



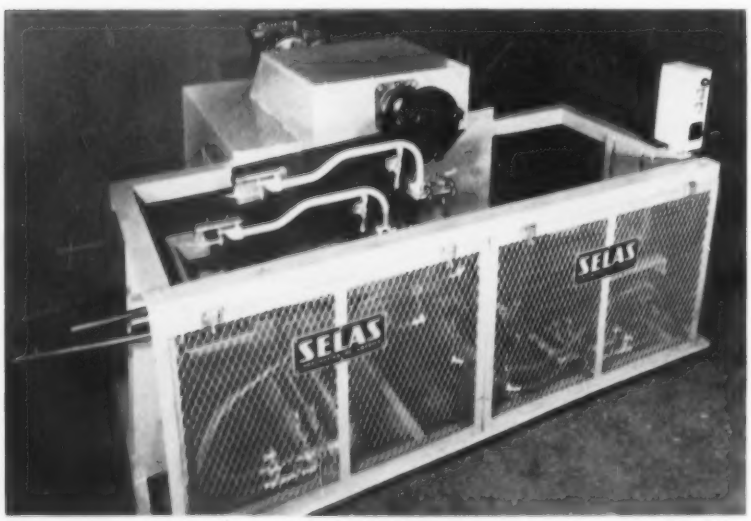
Noise Analyzer Simplifies Measurement of Impact Noise

Type 1556-A impact-noise analyzer is designed for the measurement of such impact noises as those produced by hammers, riveters, and punch presses. Instrument is an accessory for a sound-level meter, to which it is attached. Unit can measure both the peak level and the duration of a single impact.

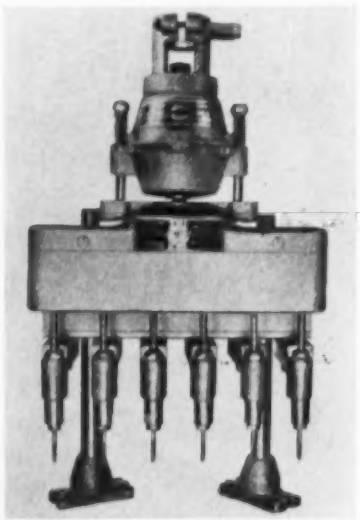
Electrical storage system is so designed that three characteristics of a sound—quasi-peak, peak, and time average—can be measured, all on only one indicating meter.

Priced at $210 fob, instrument comes complete with self-contained battery power supply.

General Radio Co, 275 Massachusetts Ave, Cambridge 39, Mass



AUTOMATIC GAS-FIRED BRAZING MACHINE brazes a fixture to each end of two pre-shaped tubes in a single operation. Accurate control of combustion, flame geometry, and timing produces required temperature (within the 50 F margin between flow point of filler alloy and melting point of parent metal) simultaneously in the thin-walled tubing, filler alloy, and heavy casting. Heating is accomplished by timer firing cycles, and burners are idled during indexing and loading-unloading periods. Selector switch provides choice of three programs to accommodate assemblies having single fitting, two fittings situated 90° from each other, and two fittings 180° from each other — *Selas Corp of America, Philadelphia 34, Penna*



Multiple Drill-Tap Head Features Flexible-Shaft Spindles

Model 1000 straight-line, flexible-shaft-spindle head will tap or drill up to six holes anywhere in a 3 x 13 15/16-in. rectangular area. Designed to fit any drillpress, unit can be set in a wide variety of hole patterns—straight-line, circular, or rectangular. Minimum center distance between two spindles is ⅝ in., and capacities range up to 5/16-in. drills or taps in aluminum.

Adjustability of spindles is provided by flexible shaft drives which permit spindles to be moved in any direction, even while unit is running. Once spindles are set in the desired position, they are locked in place by means of a spindle adjusting arm.

Conversion from drilling to tapping is accomplished by adding a standard tapping faceplate and replacing drill collets with interchangeable floating tap collets. Bulletin No. 600A.

Ettco Tool Co, Inc, 594 Johnson Ave, Brooklyn 37, NY

New Ross controls
...give operator time out!
...automates air sequencing!

Now . . . take the sequencing of pneumatic valves out of the operator's hands. Pre-set patterns of operation are carried out by the machine itself. With these new Ross valves, your cylinders can be sequenced by position or time. A complete range of control valves is available.

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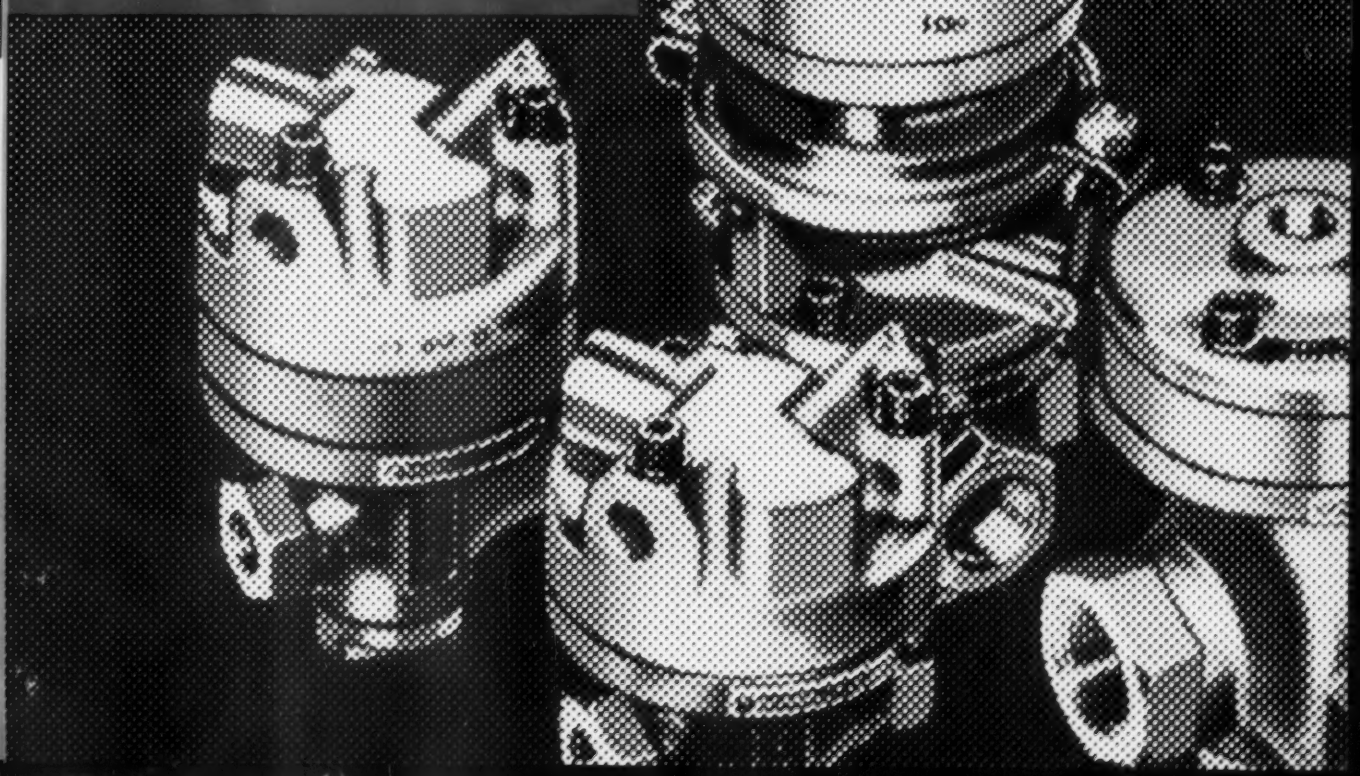
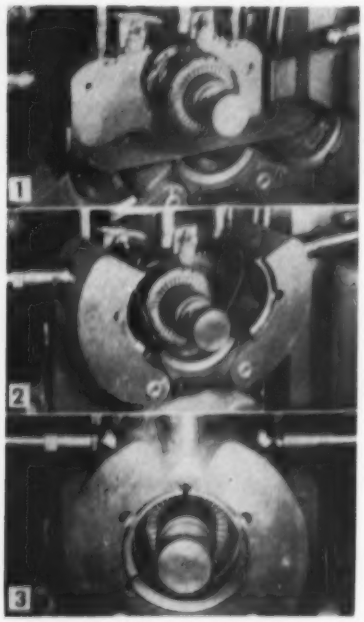
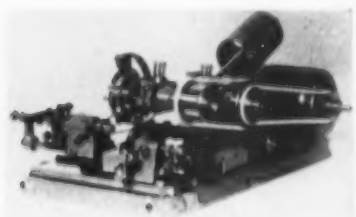




ELECTRIC-MOTOR STATOR CORES are automatically welded on special unit built for Canadian electric-motor maker. Average time for precision forming and welding assemblies has been reduced to 36 sec. Operator places strip of flat steel with preformed ends under the wound stator core, which is held on a central spigot, and presses cycle start button. Work is gripped by hydraulically operated steel jaws, then ends are welded with an inert-gas shield and wire filler. Completed assembly is then automatically removed by hydraulic means—*Standard-Modern Tool Co, Ltd, 373 Front St E, Toronto 2, Canada*

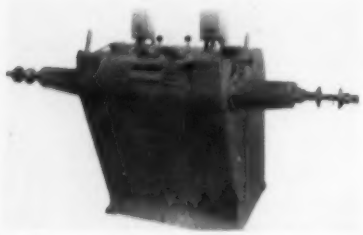


Swiss Burnishing Machine Takes 3-in.-long Work

Swiss-made Sallaz burnisher, Model R-49, is available with foot pedal or hand-lever switch. Adjustable for a wide range of work, it features simple, accurate size control and rapid chucking. Both burnishing wheel and work rest are of tungsten carbide. Interchangeable collet or center-type workheads are fitted on a horizontal swivelling plate. Wheelhead may also be tilted and moved in a horizontal or transverse direction.

Maximum work length is approximately 3 in. Machine weight is 55 lb. Model R-50, operating with seven different cycles, is available as a bench type or with stand. It has a work-length capacity of 4 in. and weighs 98 lb.

Imported by Rudolph Koppel Co, Inc, 487 Broadway, New York, NY

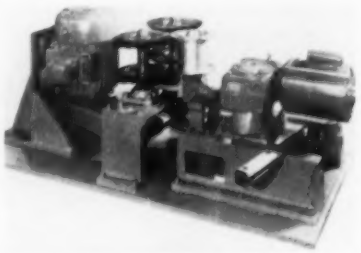


Buffing and Polishing Lathe Has Two Spindles, Wider Swing

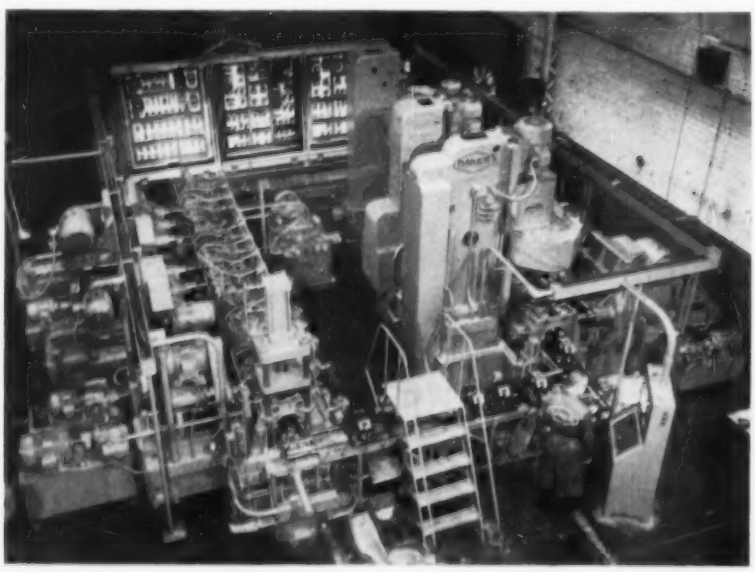
Adjustable-speed Model VRROW has a swing of 20 in. from side of base to face of inner flange instead of the usual 12-in. swing of conventional lathes.

The two spindles function independently, each with its own motor and speed control, permitting one operator to change wheels or vary speeds without interfering with or causing downtime to the other. Each operator has full 5, 7½, or 10 hp on wheels. Spindle speeds can be changed instantly while lathe is running by turning the dials.

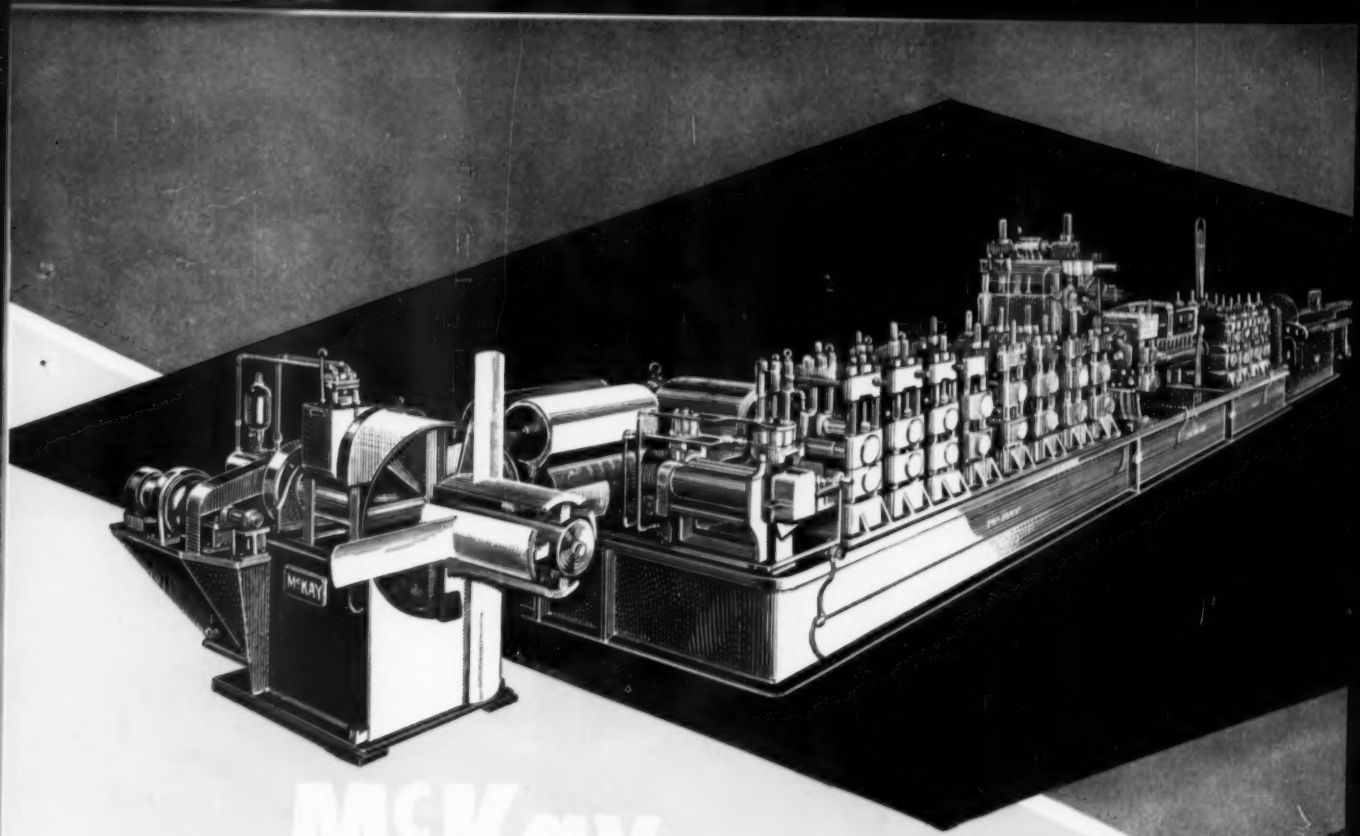
Hammond Machinery Builders, Inc, Dept 1618, Kalamazoo, Mich



WIRE-SPOOL DEBURRING MACHINE brushes out and smooths nicks and burrs on the flanges of wire spools which might damage or cut fine wire during loading or pay-off. To smooth out nicks, spool is placed by hand on a spindle that revolves slowly against four revolving Fullanchor brushes; both sides of top and bottom flanges are deburred simultaneously. Power requirements for bench machine are a 2-hp brush motor and 1/3-hp spool spindle motor — *Fuller Brush Co, Machine Div, Hartford 2, Conn*



STEEL VALVE BODIES are mass-produced on transfer machine which turns out about 73 per hr using only one operator. Completely automatic and operated from a master control board, machine has over 7 mi of electric wiring, and the electric motors produce over 236 hp. Thirty platens, each carrying a rough forging of a valve body, pass through a total of 26 stations: 10 drilling, 4 reaming, 6 tapping, 2 boring, 2 facing, 1 counterboring, and 1 broaching. Parts machined vary in size from ¼ to 2 in. Machine was built for Manning, Maxwell & Moore plant in Watertown, Mass — *Baker Bros, Inc, Toledo, Ohio*



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Resistance Weld Tube Mills . . .

FOR THE MOST EFFICIENT

TUBE MAKING IN THE INDUSTRY

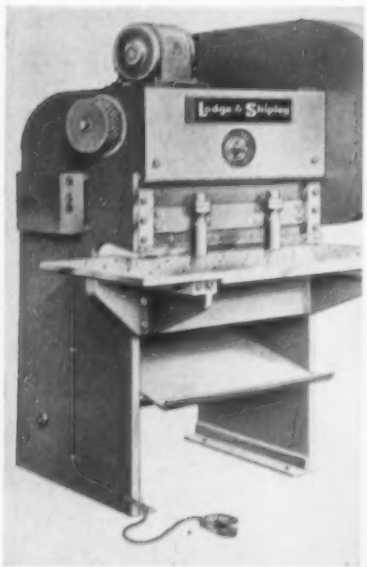
McKay Mills are recognized throughout the tube and pipe making industry as the finest equipment available. Users have found McKay gives more machine for the money — that the slight extra cost of these rugged machines is more than repaid in long trouble-free service that results in real efficiency. McKay designs and builds tube and pipe mills in all sizes.

The McKay Machine Company, Youngstown, Ohio.

9966

McK

SETTING THE STANDARDS OF QUALITY IN METAL WORKING MACHINES FOR TWO GENERATIONS



Production Shear Has 24-in. Blade For Heavy-Duty Work

24-in. speed shear, built for heavy-duty power shearing, operates at up to 120 spm, is 72 in. high and 50 in. wide and deep. Throat is 7½ in. deep, and capacity is maximum ⅛ in. in mild steel. Machine will perform straight and angle shearing, sequence shearing, slitting, notching, blanking, and duplication of straight-side parts without dies.

"End-around" table extends around left end of blade for convenience in notching and slitting. Table is provided with tapped holes for set-up of protractors, clamps, and cutting guides. For conventional shearing, machine has a front-operated back gage.

Shear is sold ready to operate, furnished with a 1½-hp drive motor and three-belt V-drive. Protractor and guides for cutting are also furnished.

Lodge & Shipley Co, 3055 Colerain Ave, Cincinnati 25, Ohio

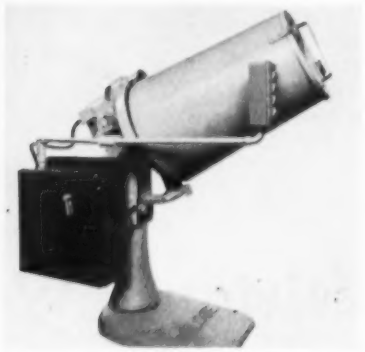
Elevator-Type Electric Furnace Uses Door as Hearth

Model IP-6700 high-temperature furnace is provided with a vertical-lift closing arrangement which permits the door, when lowered, to serve as a hearth that may be rolled to the front of the unit. Parts are easily loaded on the hearth-door, which is then rolled on tracks back to position and raised to the pit-type work chamber. Manufacturer states that this method of bottom loading provides a closer gradient than more conventional front- or top-loading designs.

Chamber size is 18 in. wide by 18 in. deep by 21 in. high; hearth measures 18 x 18 in. Raising of the hearth, which will take a work load of approximately 150 lb., is by safety hand ratchet, with power-lift equipment optional.

Furnace contains silicon-carbide heating elements, and has an operating temperature of up to 2750 F with a maximum heat-up period of 3 to 4 hours. Power rating is 35 kw.

Pereny Equipment Co, 893 Chambers Rd, Columbus 12, Ohio



Power Tilt Tumbling Barrels Available in Five Sizes

Power Tilt on Model DM-PT series simplifies loading, rinsing, and unloading. Pushbutton control starts, stops, and regulates up and down movement.

Cubical content ranges upward to 23 cu ft; maximum load capacity of the largest model is 1500 lb. All five models are available with round, octagonal, or flask-type shells, made of hard maple or steel, with or without neoprene lining.

Globe Division, Casalbi Co, 541 Wayne St, Jackson, Mich

Miniature universal joint, ball-borne Mini-Joint, is designed primarily for use in instrumentation equipment or other systems operating at low mechanical power levels. Shafts to be connected insert into hub holes. Holes are available from 3/32 to ¼-in. ID in 1/32-in. increments; body diameters at each 1/16 in. from 3/16 to ⅜ in.; body lengths are 1¼ and 1½ in. over-all; max operating angle, 30° from co-linear position.

Falcon Machine & Tool Co, 209 Concord Turnpike, Cambridge 40, Mass

TUBULAR-STEEL AUTO-FRAME CROSS MEMBERS are machined on special 12-station unit that combines features of an in-line transfer machine with those of a large center-column rotary-index machine. Electrically controlled, hydraulically operated machine drills, spotfaces, reams, and deburrs holes in a 39-in.-long, 2⅜-in.-OD bent workpiece at the rate of 200 per hr. Rotary-index machine has a 12-ft-dia cast-aluminum table indexed by a 2-hp motor. Automation devices transfer parts from the in-line machine to the index machine and also unload parts from the index machine — *Expert Automation Machine Co, 17144 Mt Elliott Ave, Detroit 12, Mich*

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Guaranteed Accuracy

More and more manufacturers apply SIP *Guaranteed* Accuracy to define, establish and maintain high precision in production and measurement to improve quality-of-output and economy-of-operation.

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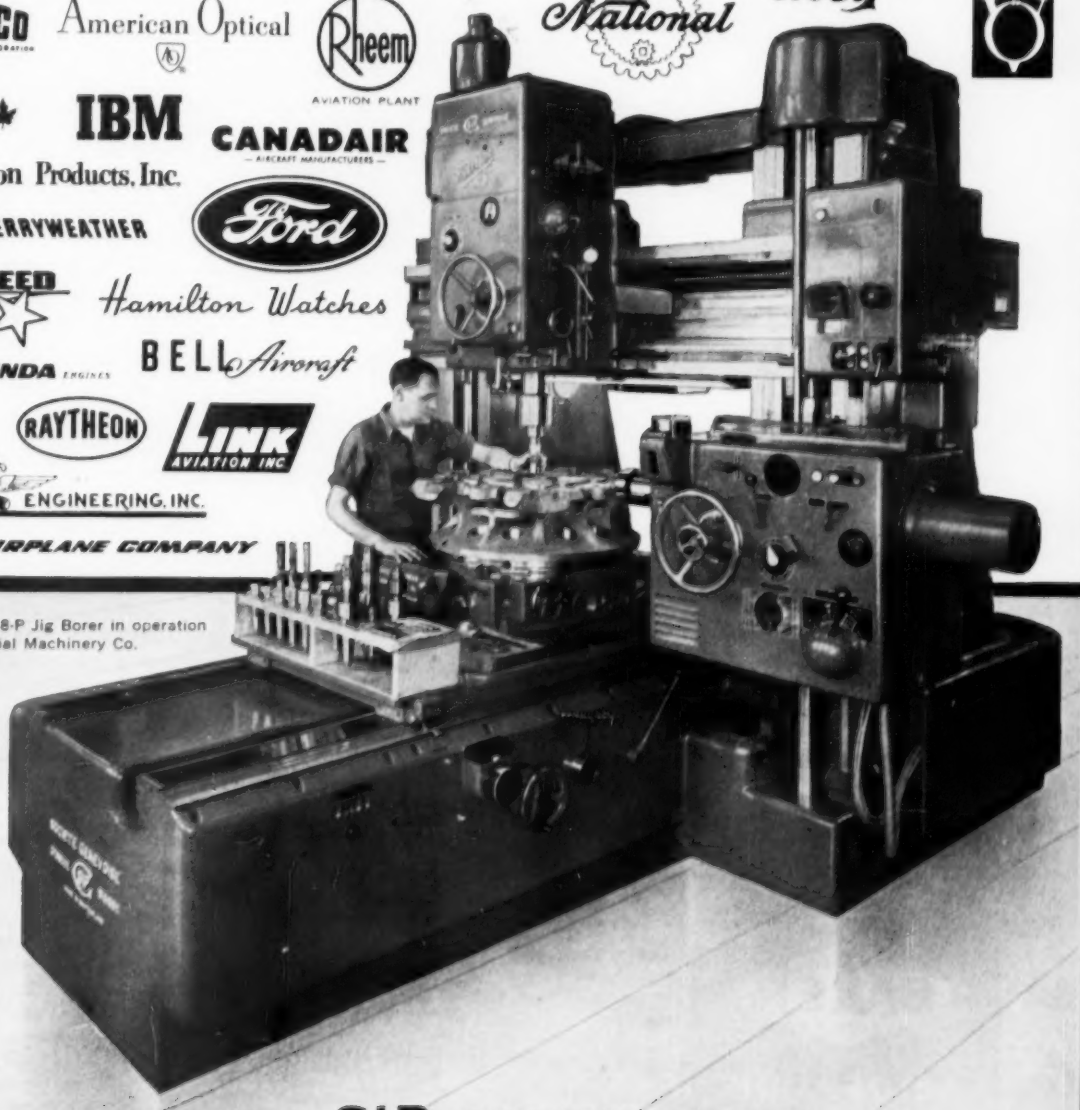
BOEING AIRPLANE COMPANY

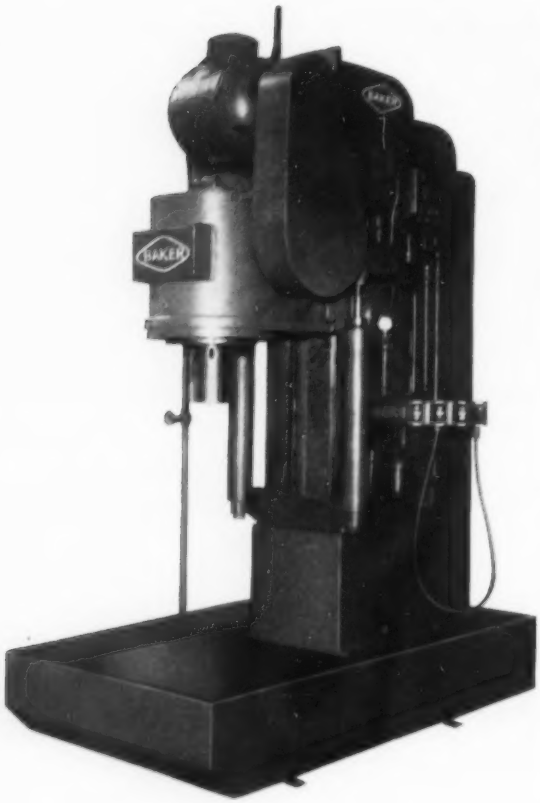


SIP HYDROPTIC 8-P Jig Borer in operation at Hartford Special Machinery Co.

AMERICAN SIP CORPORATION

HIGH PRECISION MACHINE TOOLS & MEASURING EQUIPMENT

100 EAST 42nd STREET, NEW YORK 17, N. Y.



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EVEN ON SHORTER RUNS

Yes, it does — when you automate with *standard* Baker Basic machines. They cost much less than a machine specially built for only one part . . . and pay off quicker. For example, a manufacturer recently installed 3 Baker Basics on relatively low-production jobs. He estimates that the savings through automatic operation will pay for the machines in 3 years or less. Ultimately he will incorporate these Baker Basics into a transfer machine. Baker Basics can be retooled with comparative ease and at less expense. They needn't be completely "rebuilt" for a change in product or production method. For drilling, boring, tapping and other machining operations. In 5 sizes.

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AUTOMATION
Best in the long run
Practical in the short run

.. Mail Coupon Today ....

BAKER BROTHERS, INC., Dept. AM-656
Toledo, Ohio
Please send free Catalog on Baker Basic machines.

NAME AND TITLE

COMPANY

ADDRESS

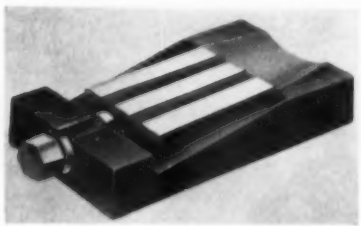
CITY ZONE STATE

Vibratory Parts Feeder

Model EB-3-B, equipped with a 36-in.-dia bowl, handles parts up to 8 in. long in clockwise or counter-clockwise direction.

Unit can be equipped with single or dual discharge to gravity tracks for automatic feeding. Feed rate can be regulated by adjusting a rheostat in the separate controller. Parts discharge from the tracks and are regulated by solenoid and air-operated escapement mechanisms.

Syntron Co, 311 Lexington Ave, Homer City, Penna



Medium-Duty Leveling Jack

Empco Style JD-O, with lifting capacity exceeding 3000 lb, is composed of three basic parts: machine support base, cradle, and adjusting screw. Design incorporates self-alignment features to compensate for uneven floor surfaces up to 5°.

Unit measures 6 in. long, 3½ in. wide, 1⅛ in. minimum height; it provides lift adjustment of ¼ in. Total weight is 5 lb. Model is available equipped with felt pads to reduce machine and floor vibration.

Enterprise Machine Parts Corp, 2731 Jerome, Detroit 12, Mich

Rust preventive spray, called Rust Chek, for tools, parts, and machinery, is packaged in a 12-oz aerosol container providing approximately 80 sq ft of coverage in the form of a clear, dry, waxy film to a thickness of 0.0005. Film, which is worked off in use, does not absorb dust and dirt.

Eastern Aerosol Products, Newfoundland, NJ

"The right quench oil for our work is

SHELL VOLUTA OIL 23"

says Garland Wilcox, Chief Metallurgist
Wallace Barnes Co., Bristol, Conn.

...the story of a profitable change

WALLACE BARNES COMPANY and steel springs have "gone together" for nearly a century. Most of today's output is in SAE 1075 or 1095 steel.

Because the quenching operation is so important to the life of springs, the Wallace Barnes laboratory decided to test its regular quenching oil against some of the newer products, including Shell Voluta Oil 23. This is what they found:

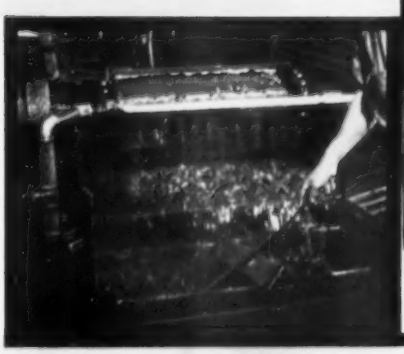
Shell Voluta Oil 23 showed a superior quench rate, with correct hardening and relative freedom from distortion. It drained more rapidly from the quenched parts, reducing dragout loss. It washed off more completely in the alkaline cleaner; it reduced flaming, and cut down on the oil baked to parts.

Wallace Barnes reports that this oil has almost eliminated trouble with "slack-quenched parts," and that heavier stock now goes through without special handling. So . . . Shell Voluta Oil 23 has replaced the former quench oil in all tanks of the spring hardening departments, serving salt pot lines and shaker hearth furnaces.

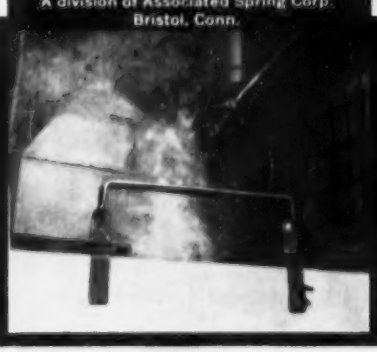
We'll be glad to provide full information on Shell Voluta Oil 23.

WALLACE BARNES CO.
A division of Associated Spring Corp.
Bristol, Conn.

Photos courtesy "STEEL"



Shaker hearth furnaces automatically dump parts into Shell Voluta Oil 23, then remove and drain them.



Flat springs at austenitizing temperature get a fast quench in Shell Voluta Oil 23.

Over 35,000 prints of production items like these are kept on file at Wallace Barnes Co.

SHELL OIL COMPANY

50 WEST 50TH STREET, NEW YORK 20, NEW YORK
100 BUSH STREET, SAN FRANCISCO 6, CALIFORNIA

SHELL

Production costs "Automatically" reduced with Milford Rivets and Rivet-Setting Machines

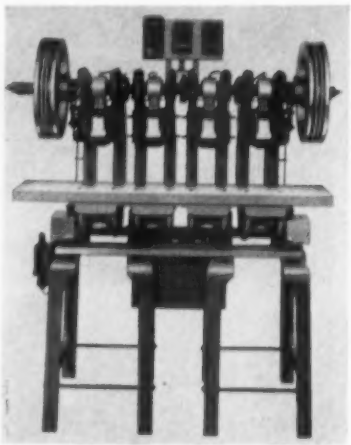
Here's a team that cuts production costs and makes the job simpler—Milford Rivets made to high quality standards to assure a better assembled product . . . Milford Rivet-Setting Machines that can be readily adapted to your production needs.

To reduce delivery time and production costs, to improve product appearance, to assemble your product on automatic rivet-setting machines—get in touch with Milford right away!

THE MILFORD RIVET

MILFORD RIVET & MACHINE CO.

MILFORD, CONNECTICUT • HATBORO, PENNSYLVANIA
ELYRIA, OHIO • AURORA, ILLINOIS • NORWALK, CALIF.



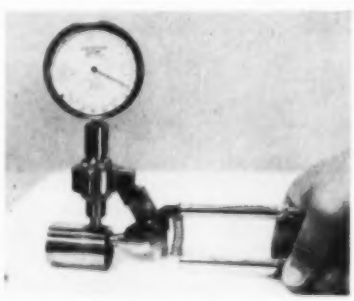
Multiple-Ram Presses

Engineered to supply a large bed area for multiple-die operations where only moderate tonnage is required per die stage, multiple-ram presses can be supplied in any number of rams in tandem, each ram performing one operation in a progressive setup. All units operate on a common crankshaft.

Strokes can be furnished of uniform lengths, or each stroke can vary to suit requirements, thus providing such operations as shearing, piercing, bending, and forming in the same line. Ram travel is synchronous: rams descend simultaneously, alternately, or at staggered intervals, depending upon crankshaft design.

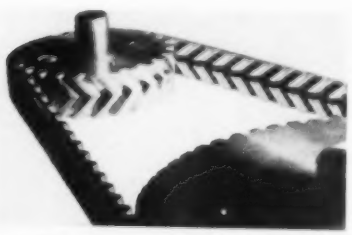
Presses can be supplied with any frame spacing, and in 2-, 5-, or 8-ton units, plain or backgeared. All members of the tandem, however, must be of the same tonnage rating.

Benchmaster Mfg Co, 1835 W Resecrans Ave, Gardena, Calif



HARDNESS TESTER known as the Oppel is a light-weight portable instrument manufactured in West Germany. Device covers the five most widely used hardness scales—*Imported by Company for Technical Progress, Cincinnati 29, Ohio*

BORING BARS called Deka-Bore incorporate a series of eight interchangeable quills with a range of ½ to 3 in. in Model A-2P and 1⅜ to 6 in. in Model A-4P. Toolbit can be adjusted infinitely in either direction without backlash, according to maker. Accuracy of adjustment is obtained by a series of ground and lapped eccentrics which are sealed against dirt and dust penetration. Adjustments are made by loosening three screws and rotating knurled member the required amount, according to matching lines calibrated on the periphery of the bar's body diameter. Adjustments can be made by eye in increments of 0.0001 on the diameter and 0.00005 on the radius—*Precision Tool & Mfg Co of Illinois, 1305 S Laramie, Cicero 50, Ill*



Non-Slipping Belt

Herringbone-indexing style belt will reportedly transmit rotational motion with greater accuracy than gears or any other belt design over the same ratios normally encountered in gear drives.

Special neoprene construction is said to provide resiliency of belt teeth so that tooth error of the gear is integrated over all of the teeth engaging the belt, thus averaging any slight residual error in the driving gears. V-shaped tread tends to

Chain Belt Co. Installation. Tool index boards, left, quickly locate all tools. Employee record boards show all tools charged to each employee.

CHAIN BELT COMPANY OF MILWAUKEE REPORTS

"We couldn't get along without our McCaskey Tool Crib Control"

Twenty years of service for Chain Belt Company of Milwaukee has proved McCaskey Tool Crib Control is an indispensable part of any tool crib operation. Experience has shown that the small initial investment is often returned many times within the first year of use, and that annual savings can amount to thousands of dollars.

McCaskey tool accountability cabinets in Chain Belt Company tool crib.

Here are just a few ways McCaskey Tool Crib Control has saved money for Chain Belt Company and will save money for you:

(1) Keeps tool inventory in the crib at a minimum, reducing monthly purchases.

(2) Prevents accumulation of idle tools at machines or benches.

(3) Reduces tool breakage by identifying source of breakage.

(4) Reduces loss and misplacement.

(5) Eliminates slow crib service, reduces non-productive time of employees and machines.

And, the McCaskey System does all this and more without additional crib personnel. McCaskey Systems are completely flexible—there is a set-up for your plant regardless of size or products. Find out how you can cut your tool expense . . . mail the coupon today.

McCASKEY INDUSTRIAL CONTROLS
Production • Inventory • Tools • Maintenance • Costs
Division of
VICTOR ADDING MACHINE CO.
3900 N. ROCKWELL STREET • CHICAGO 18, ILLINOIS

VICTOR-McCASKEY LIMITED,
GALT, ONTARIO

Manufacturers of Business Machines Cash Registers, Business and Industrial Systems, Electronic Equipment, Electri-Cars.

Victor Adding Machine Company
McCASKEY INDUSTRIAL DIVISION, Dept. A6
3900 North Rockwell Street, Chicago 18, Ill.

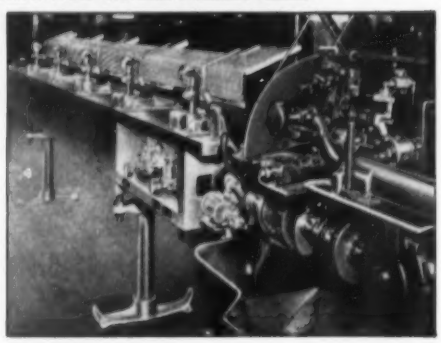
Please send me your new booklet, "How Tool Costs Were Cut 12 Ways in 20 Plants."

Name_____

Position_____

Company_____

Address_____



LOSING BUSINESS because of screw machine PRODUCTION COSTS?

GET COMPETITIVE with the Lipe Automatic Magazine-Loading BAR FEED!

Count up the time losses that occur in an average day with so-called automatic screw machines. Count shutdowns for feed finger adjustments, removal of jammed remnants, operator trips to the washroom. Count slowdowns caused by length-of-feed limits which require multiple-feed finger feed-outs. If you're realizing as much as 60% of gross geared production capacity, you're doing *well*—for feeding equipment that is not fully automatic.

Our engineers will gladly help you reduce screw machine production losses. For full details on the Lipe A.M.L. Bar Feed, send today for 6-page folder and name of nearest distributor.

A. M. L. Produces 30% to 100% More Output by Eliminating Time Losses!

- Automatically feeds bar stock to screw machine.
- Feeds stock to screw machine *continuously*, independently of operator.
- Cuts cycle time: *guaranteed* to attain at least 90% of machine's gross geared production capacity.
- Eliminates feed fingers . . . multiple feed finger feed-outs . . . feed finger adjustments and replacements. No jamming of remnants.
- No cutting air. No minimum or maximum run. No limit on length of feed. No selective stock length requirement.

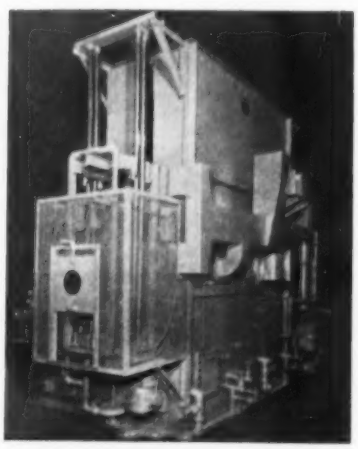
Lipe-ROLLWAY CORPORATION
SYRACUSE 1, N. Y.

Manufacturers of Automotive Clutches & Machine Tools

wedge continuously, thus centering the belt in corresponding V-tread of the gears, permitting gears to be constructed without belt restraining rims.

Kinevox Division, Electromation Co, Burbank, Calif

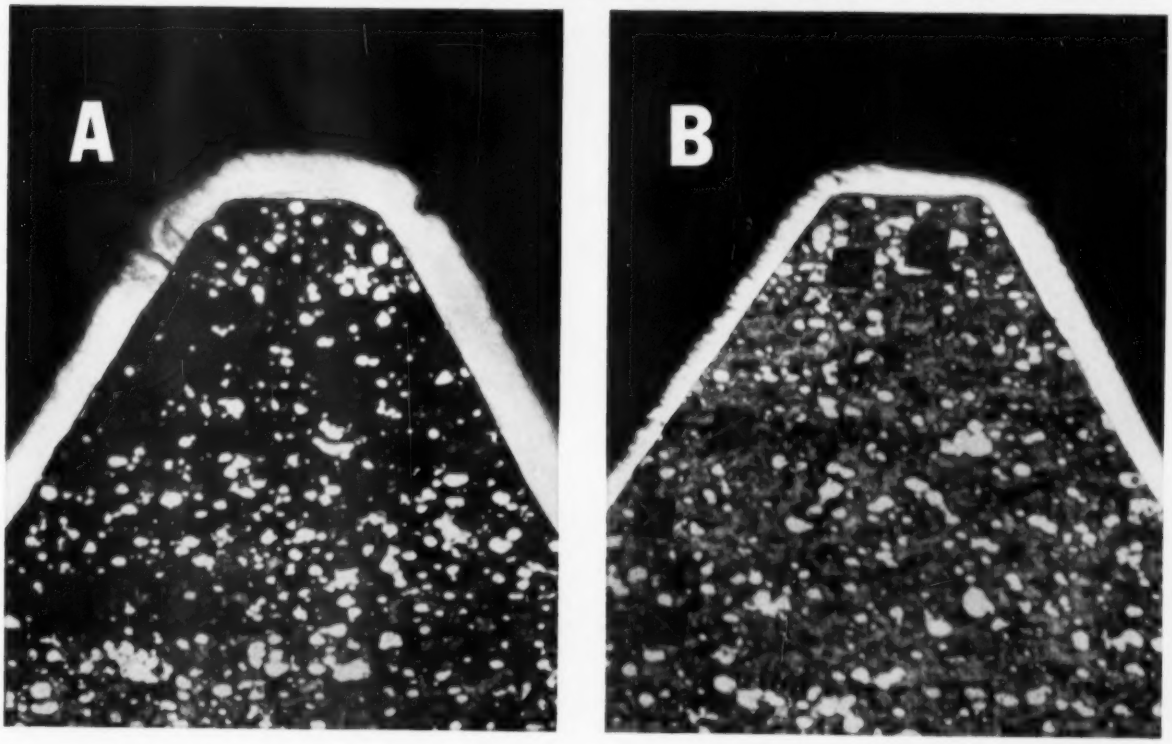
TEST INDICATOR called Check Master can be used for both setup work on a surface plate and truing of pieces in machine tools. One model reads in 0.0001 in., another in either 0.0001 in. or 0.001 in. Latter model can be fitted with a longer (0.662 in.) contact arm which enables user to gage places otherwise inaccessible. Light contact pressure of 15 grams with shorter point and 8 with the long makes gage unusually sensitive. Maker claims instrument will respond to dimensional variations of 0.00002 in. Device is supplied with both a toolpost bar and a round collet bar. Range is 0.008 in. (0.016 in. with longer contact point)—*Standard Gage Co, Inc, Poughkeepsie, NY*



Elevator Degreaser Provides Automatic Cleaning

Degreaser called Hydro-Lift uses hydraulic power throughout, and all moving conveyor parts within the

WHICH OF THESE TAP SURFACES WAS REJECTED BY HY-PRO'S MICRO-HARDNESS TESTER?



The flaws in Tap A were revealed by Hy-Pro's Micro-Hardness Tester—part of Hy-Pro's exclusive 3-way Quality Control!*

THE machines that grind a tap surface can generate a great amount of heat. Without Hy-Pro's control, this heat can burn and soften the tap, weakening it to a serious extent.

Such weakening is invisible to the naked eye. But Hy-Pro's Micro-Hardness Tester reveals the extent of the flaw every time! What does this mean to you? Productivity per tap has been increased by 20 to 25 times through the selective work of Hy-Pro's Micro-Hardness Tester. And that means time and money saved on your production line.

The Micro-Hardness Tester is an important part of Hy-Pro's exclusive 3-way Quality Control, which guarantees you the finest taps in the world. Incidentally, the Hy-Pro Micro-Hardness Tester is the only known microscopic hardness examination for both interior and exterior surfaces. Even the tap's cutting edges are checked down to half a thousandth of an inch.

If you would be interested in taps by Hy-Pro—the Tap Specialists—see your nearest Hy-Pro distributor or call us direct. Believe it or not, Hy-Pro Taps cost no more than ordinary taps.

*The small dark squares are diamond impressions used in testing the structural strength.

REG. U.S. PAT. OFF.

HY-PRO

"The Tap Specialists"

New Bedford, Massachusetts, U. S. A.

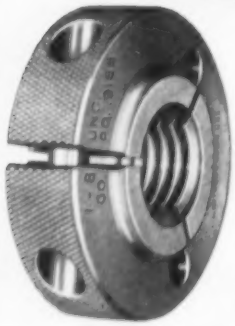
ADDITIONAL WAREHOUSES:

10428 W. McNICHOLS RD.
DETROIT 21, MICH.
UNIVERSITY 4-1077

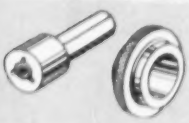
1132 LAWLER ST. (WORTH)
CHICAGO, ILL.
GARDEN 4-0217

109 EDISON PL.
NEWARK 5, N. J.
MARKET 2-4318

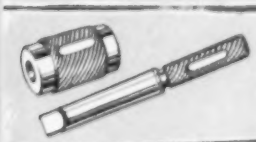
Shortest Route to Quality Control is via PRATT & WHITNEY



THREAD GAGES

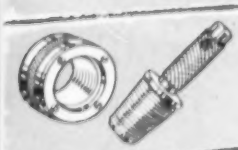


Cylindrical GAGES



TAPER GAGES

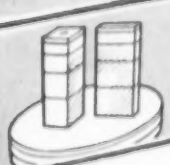
ROLL THREAD SNAP GAGES
Adjustable Limit Snap Gages



Oil Country GAGES

RAILROAD GAGES

PRECISION END MEASURES



Precision GAGE BLOCKS

shortest route . . .

because Pratt & Whitney manufactures *complete* lines of conventional hand gages. You can select — from just one source — *all* the types and models you need to establish efficient quality control methods in your plant. A few of the many available are shown here.

surest route . . .

because into every Pratt & Whitney Gage is built an unmatched quality and accuracy that insures higher standards of precision maintained with complete dependability.

start off now

on the right foot — write now for descriptive literature on the P&W Gage types you need. And if you want expert help in selecting the best gages for your specific requirements, call in a Pratt & Whitney Gage Specialist . . . there's one conveniently located in your area.

PRATT & WHITNEY COMPANY
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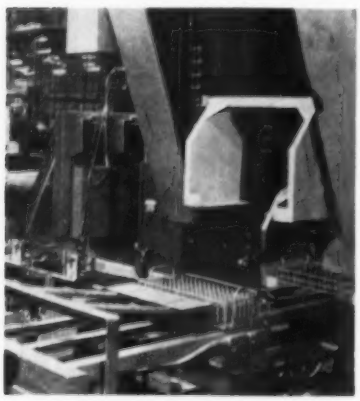
MACHINE TOOLS • GAGES • CUTTING TOOLS

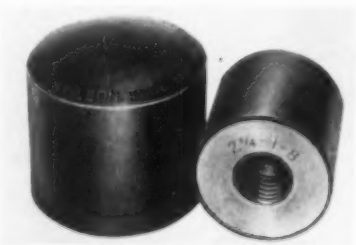
degreaser are eliminated. Baskets of parts can be processed through system, which can be integrated with automated lines.

In the solvent degreasing cycle, basket filled with work can be automatically picked up from conveyor, immersed in solvent vapors, and transferred to successive cleaner-sprays of chlorinated solvents, followed by vapor rinse and drying. Work can then be coated with filtered rustproofing oil and automatically discharged to the assembly area.

Detrex Corp, Detroit 32, Mich

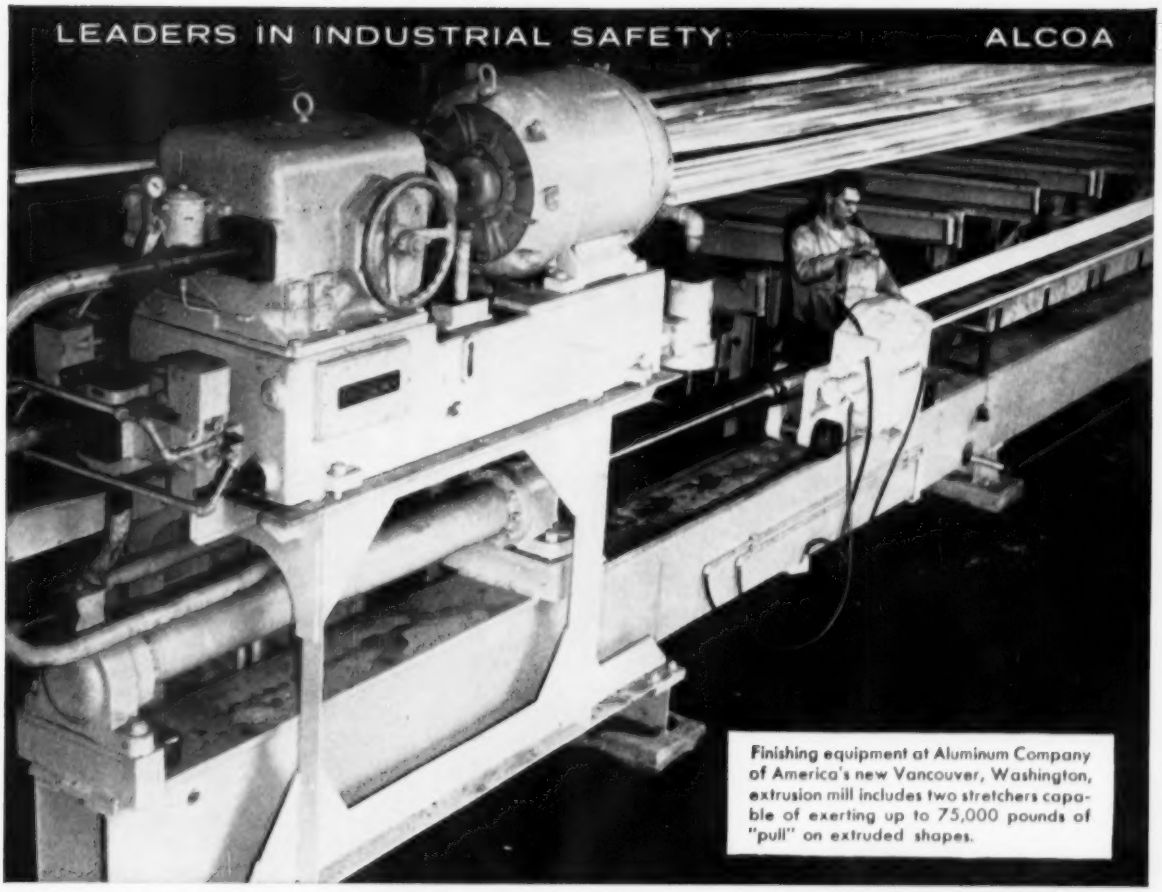


AUTOMATIC FEEDER AND UNLOADER for transferring product-laden baskets to and from conveyor systems and process machinery is designed for production-line loading and discharging of baskets into and from cleaners, degreasers, heart-treating equipment, and the like. Feeder section and unloader section are available as independent units for basket movement involving one-stage basket transference from one conveyor to another, or for simple flow-line switchover. Both units are internally coordinated to prevent out-of-step feed, and can be operated at any practical speed — *Circo Equipment Co, 51 Terminal Ave, Clark (Rahway), NJ*



Cylinder-Shaft Bumpers

Contour-molded neoprene bumpers are designed for use on air and hy-


LEADERS IN INDUSTRIAL SAFETY: ALCOA
Finishing equipment at Aluminum Company of America's new Vancouver, Washington, extrusion mill includes two stretchers capable of exerting up to 75,000 pounds of "pull" on extruded shapes.

One of the things that impresses visitors to Alcoa is the strong emphasis on safety. It isn't surprising, then, to find fire-resistant Pydraul used in Alcoa hydraulic equipment... eliminating a potential source of fire.

FIRE-RESISTANT PYDRAUL F-9 CHANGES FIRE ZONES TO SAFETY ZONES

275 million hours of actual in-use operation—without a single hydraulic fire—*proves* the safety and dependability of fire-resistant Pydraul hydraulic fluid.

But Pydraul gives you more than safety. You can be sure of long equipment life with low maintenance . . . because Pydraul lubricates like a premium petroleum oil. You'll save money on fluid consumption, too! Pydraul is reclaimable—you can return spillage to the system, use it again and again.

Make a quick check of your hydraulic equipment . . . calculate your fire risk if it's close to hot metal, electrical contacts, open flame or other heat sources. Then talk to a Monsanto representative. He will show you how easy it is to convert to Pydraul . . . giving you a future of positive safety from hydraulic fires . . . at low cost per year.

PYDRAUL MEANS:

Fire Resistance
Excellent Lubricity
High Stability
No Corrosion
Re-use, Again and Again

Write now for new booklet, "PYDRAUL F-9," Organic Chemicals Division, MONSANTO CHEMICAL COMPANY, Dept. PYD-1, St. Louis, 1, Mo.

PYDRAUL F-9—First and Only Hydraulic Fluid Listed by Underwriters' Lab.

On May 31, 1955, Pydraul F-9 became the first fire-resistant hydraulic fluid listed by Underwriters' Laboratories. From the Laboratories' Service Card: "The fire hazard of (PYDRAUL) is rated 2 to 3 in accordance with Underwriters' Laboratories, Inc.'s Standard of Classification in which Ether rates 100, Gasoline rates 90-100, Alcohol (ethyl) rates 60-70, Kerosene (100° F. flash) rates 30-40, and Paraffin oil rates 10-20." See Underwriters' Laboratories, Inc.'s guide No. 540 18, File MH6049.

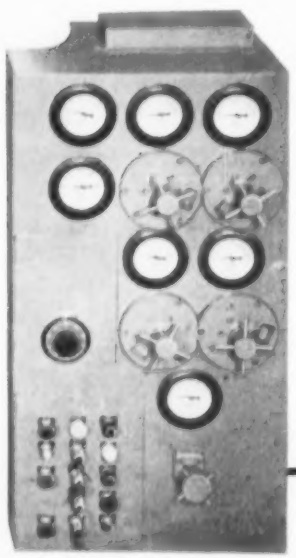
PYDRAUL: Reg. U. S. Pat. Off.

MONSANTO

WHERE CREATIVE CHEMISTRY WORKS WONDERS FOR YOU

Farquhar... the first triple-acting press with electric magnetic controls...

EVERY ADJUSTMENT of speed, timing and pressure is made by the operator on this Control Panel without leaving his operating station. It is no longer necessary for him to climb to the top of the press for this purpose.



...the only press that can do so many things so well

THIS hydraulic press revolutionizes the high speed production of draw-formed parts. We believe that it has rendered obsolete every double-acting and triple-acting press now in service. These are challenging statements... *but read the facts.*

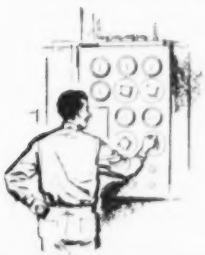
A. B. Farquhar Division, The Oliver Corporation
Press Department, York 13, Pennsylvania

OLIVER

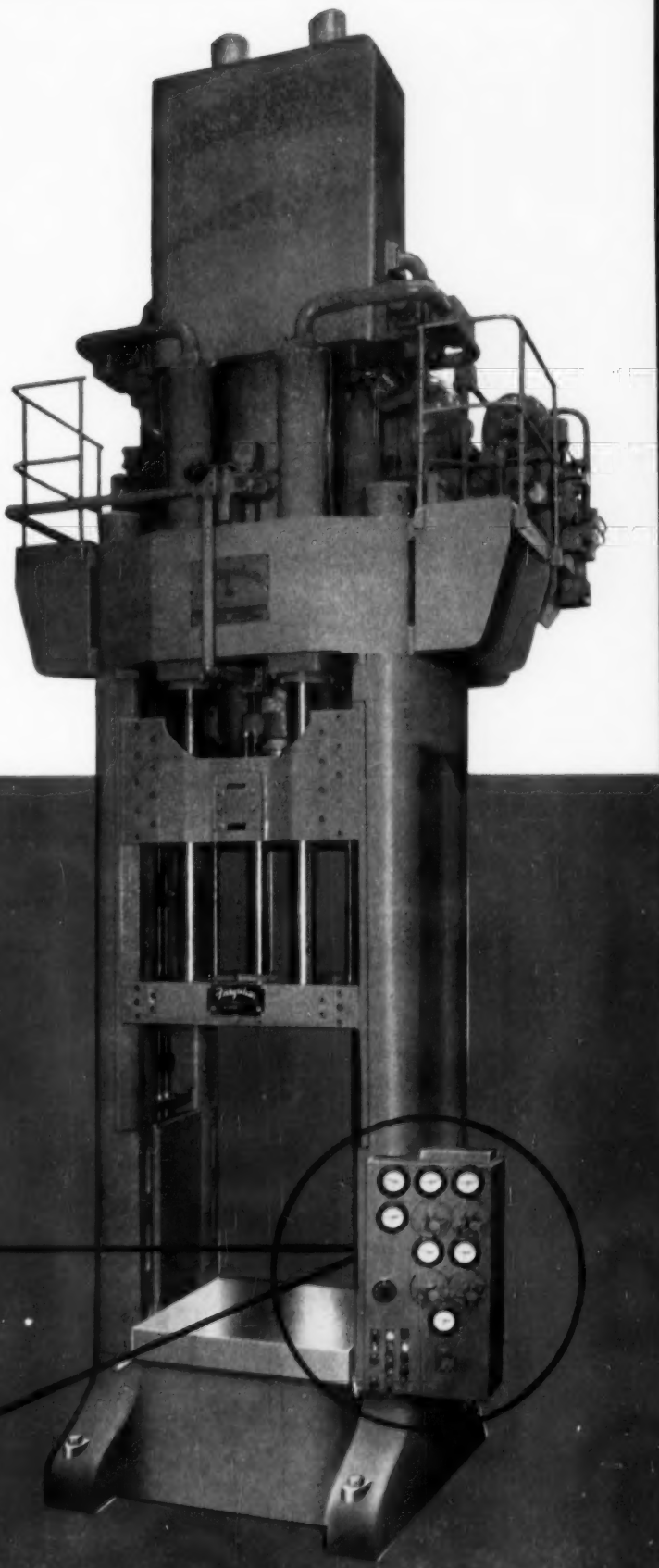
Farquhar PRESSES

DRAWING • FORMING • FORGING • STRAIGHTENING • BENDING

- **Unlimited speed changes** now possible at any point in the cycle. This means, for example, that the ram can approach the draw at maximum speed, slow down as it enters the draw, change speed in the middle of the draw, strip slowly and return to up position at maximum speed.
- **Draw-forming of difficult materials** is thereby greatly simplified and improved. The exact speed can be selected which is best suited to the characteristics of the material at any point in the stroke.
- **Expensive dies** can be given added protection by "gentle" treatment at point of contact and withdrawal.
- **Cycle time is greatly reduced,** because maximum speeds can be attained at every desired point in the cycle.



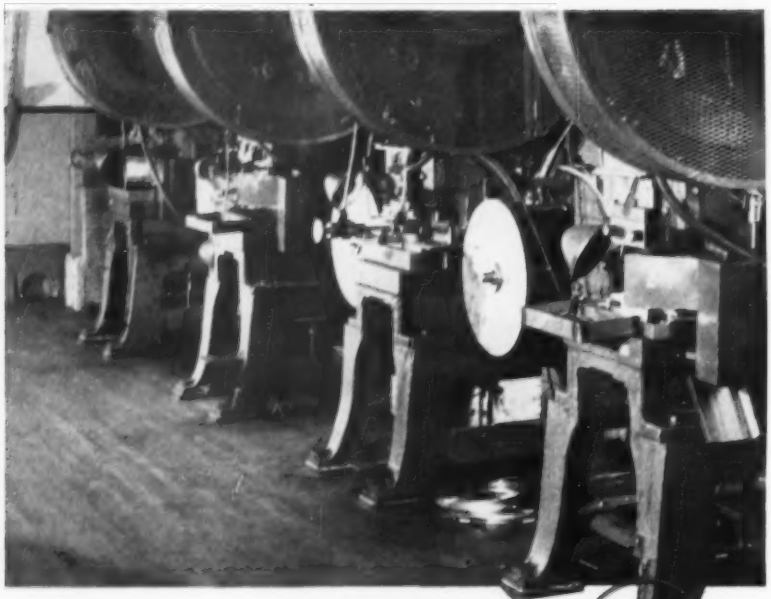
- **No expensive cams** with time-consuming adjustments are needed to obtain these results. All speed changes are made by dial settings on the control panel.



- **4-point adjustment of blank holder pressure** is made by operator without leaving operating station, an important device in the draw-forming of eccentric shapes. This has been a feature of Farquhar Double-Acting Presses in the past. It is an important feature of the new Farquhar Double and Triple-Acting Presses, too.
- **Best of all,** with these additional advantages, the Farquhar Double and Triple-Acting Presses are competitively priced!
- **For a more complete description** of these new Farquhar Presses with electric magnetic controls, write for Bulletin A-200. Please use your company stationery. A. B. Farquhar Division, The Oliver Corporation.

Speeds are pre-set by these radio-type dials which can be located within the main control panel or in a remote position.

FORCING • ASSEMBLING • EXTRUDING • AND OTHER OPERATIONS



Unisorb Cuts Machinery Installation Costs up to 30%

It's always surprising how much you can save by mounting your machinery on Unisorb. Here are the four big money savers:

- **Forget about bolts and lag screws. No holes to drill, legs to center, floors to be patched.**
- **Save up to 30% on labor and materials.**
- **Heavy machinery can be on the job in hours saves up to 80% on installation time.**
- **Unisorb holds for keeps, yet can be unbonded when required. No maintenance, no checking required.**

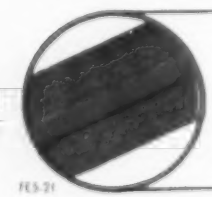
All this plus the ability of Unisorb to reduce transmitted vibration by as much as 85%!

Get this FREE book. Take advantage of this cost saving the next time you have a machine to install or move.

The name to remember is

UNISORB

the **FELTERS** company
200 SOUTH STREET, BOSTON 11, MASS.
Manufacturers of Felt and Felt Products
Offices: New York, Philadelphia, Chicago, Detroit, St. Louis
Sales Representative: San Francisco
Mills: Johnson City, New York; Millbury, Mass.; Jackson, Mich.
Representatives in principal cities throughout the world



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Name.....Title.....
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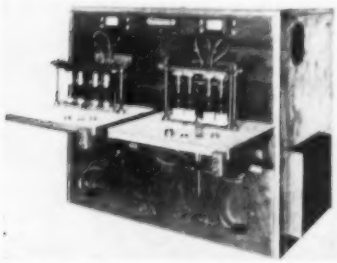
Company.....
Street.....
City.....Zone....State.....

FES-21

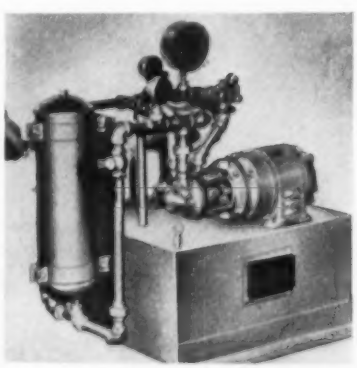
draulic cylinder shafts as ejectors and also as shock-absorbing rests and stops for elevating or horizontal traveling mechanisms. Core is of cold-rolled steel, drilled and tapped to size.

Units can be used in any operation requiring movement limitation of automated equipment, or as actuating devices, or contacts to lessen noise, wear, and injury to parts.

Stilson Tool, Inc, 30231 Groesbeck Highway, Roseville, Mich



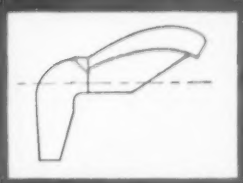
INDUCTION HEATING GENERATOR in 5-kw, 2-station model has special fixtures for the automatic assembly of 4-piece refrigeration seals. Unit produces four complete assemblies every 30 sec, and is adaptable to other similar multiple-assembly operations. Left-hand station silver-solders a brass bellows to a shouldered cast-iron washer. This sub-assembly is moved to the right-hand station, a spring is placed over it, and a steel washer is placed on top of the spring. In one operation, station aligns assembly to within 0.005 in. and soft-solders washer to the open end of the bellows, thus retaining the spring. Automatic quench system is an integral part of the tooling—*Reeve Electronics, Inc, 609 W Lake St, Chicago 6, Ill*



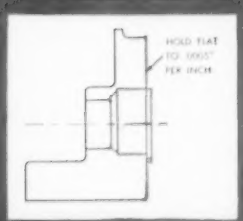
Circulating Lubrication Systems

CS Systems are designed to provide continuous re-circulation of filtered

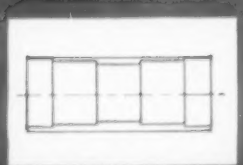
Setup and Tooling Costs ON THE HOUSE



Part—Anvil. Material—cast iron. Operation—turn elliptical contour of 220°, 15° angle on face and short O.D. on opposite end. Comment—could not be turned economically prior to use of Air-Gage Tracer.



Part—Gear housing. Material—aluminum casting. Operations—turn, face and bore. Total machine time—3 minutes.



Part—Motor shell. Material—seamless steel tubing. Operations—face and bore both ends. Floor to floor time per piece—1¾ minutes.

Part—Housing cover. Material—aluminum forging. Operations—turn, face both sides and bore. Floor to floor time per piece—4¾ minutes. Previous production—7 pieces per hour.

How One Leading Contract Shop Affords It

What's the secret of absorbing these costs—with competitive bidding and profit margins as they are in the contract shop field today?

"Simple," says C. C. Gregson, President, Illinois Gage and Manufacturing Company of Franklin Park, Ill., leading supplier of highly specialized machining of aluminum and magnesium castings. "We are able to produce a better job faster and hold close tolerances more economically than shops *provided with conventional equipment*. Setup and tooling is so minor that in most instances the customer is not even charged for it."

Note that phrase "conventional equipment"—it's the pay-off! The one 16" and the two 13" Monarch lathes you see pictured below are all Monarch Air-Gage Tracer equipped. So is the 10" Monarch that isn't in the picture. There's your difference!

To quote again, "we have found they speed up production anywhere from 10% to 90%." Air-Gage Tracers in your plant would likely enable you to realize similar savings. Why not investigate? . . . ***The Monarch Machine Tool Co., Sidney, Ohio.***

Monarch

ACCURACY • ECONOMY • LONG LIFE

TURNING MACHINES

FOR A GOOD TURN FASTER . . . TURN TO MONARCH

New King Brinell Microscope

Gives Fast, Accurate Readings

New improved design for reading Brinell impressions where other microscopes cannot reach.

Small nose gets into corners, holes, behind shoulders . . . requires less grinding on castings, billets, die blanks . . . fits flush over impressions —even on curved surfaces.

Compact, lightweight stainless steel construction. The King deep-reading microscope requires no adjustment to the eye, uses finest available lenses and built-in illumination for accurate readings.

Offset model with tapered nose reads impressions on inside surface of pipes and tubes.

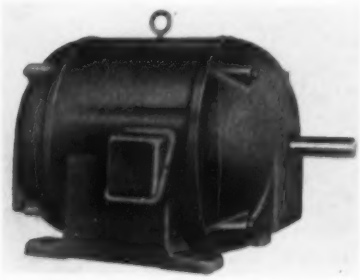
Write for illustrated bulletin and specifications.

KING
TESTER
CORPORATION
13th & BUTTONWOOD STS.
PHILADELPHIA 23, PA.

oil to bearing surfaces of light, medium, and heavy-duty machinery.

Units consist of liquid pump, tank, filter, heat exchanger, control valve, and required piping. Easily installed systems prevent oil breakdown and consequent development of sludge and harmful deposits.

Bowser Technical Refrigeration, Terryville, Conn



Motor Line Has 40 C Rise

Marble-Card standard motors have a 40 C rise and are now splash-protected. Both old and new NEMA frames are available at the same price.

Units are furnished in 1/6 to 125 hp, with 900, 1200, 1800, and 3600-rpm ratings for 208, 220, 440, or 550-v, 50 and 60-c power supplies. Motors have high temperature insulation, cast-steel frames. Integral horsepower squirrel-cage rotors are dynamically balanced for quiet operation. All models are equipped with ball bearings.

Marble-Card Electric Co, Gladstone, Mich

Eutec-SilWeld 1618, a high silver content alloy blended with special flux, is recommended for preplacement, tinning, filling, overlaying, and joining. Available in paste form, it can be applied with brush or spatula. Product is said to produce shear strengths up to 125,000 psi; permits bonding at from 25 to 150 F. Details in folder TIS 2406.

Eutectic Welding Alloys Corp, 40-40 172nd St, Flushing 58, NY

Hardfacing powders, nickel base alloy, can be sprayed from various types of guns and applied to practically all metals with melting points above 1850 F. Hi-C spray powders are available in Rockwell C hardnesses of 40, 50, and 60. Deposits are said to have excellent resistance to wear, corrosion, and oxidation at high temperatures.

Superweld Corp, 6840 Vineland, North Hollywood, Calif

Make Accurate Brinell Tests Anywhere!

KING PORTABLE BRINELL HARDNESS TESTERS are used the world over where ease of operation, dependability, guaranteed accuracy are essential.

- make tests in any position, anywhere — even in small, cramped spaces other testers cannot reach
- test parts of any size with removable test head—a King exclusive
- get accurate results every time—full 3000 kg load on 10 mm ball gives clear, sharp impression

Write for complete specifications, prices on full range of models and adapters.

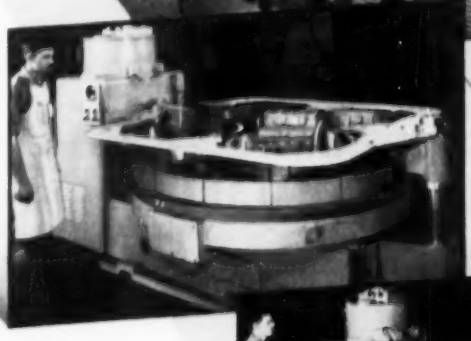
KING
TESTER
CORPORATION
13th & BUTTONWOOD STS.
PHILADELPHIA 23, PA.

in this line-up...

Model 12 handles 3
4-in. dia. parts up to 705
¼-in. dia. parts per load.

Model 24 handles 3
9½-in. dia. parts up to 3900
¼-in. dia. parts per load.

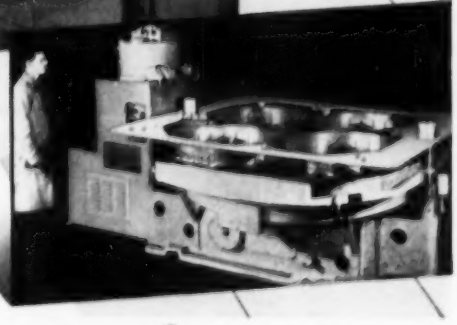
Model 36 handles 4
13¾-in. dia. parts up to 4000
⅜-in. dia. parts per load.



Model 48 handles 4
17-in. dia. parts up to 940
1-in. dia. parts per load.

Model 72 handles 4
27-in. dia. parts up to 2480
1-in. dia. parts per load.

Model 84 handles 4
32-in. dia. parts up to 3500
1-in. dia. parts per load.



there's a specific *Lapmaster*® to give you:

1 Precision Flatness

2 and Finish

in production quantities

Parts large or small—tall or squat—whatever the case may be, there's a Lapmaster tailor-made to meet your production requirements at the lowest possible cost per piece.

If you are now lapping by other means—hand scraping or grinding—it will pay you to investigate the Lapmaster. Our fully equipped lapping laboratory is at your disposal to analyze your problem, test run a number of pieces and furnish you with a complete production report without obligation.

"John Crane" Lapmasters are capable of consistently producing flatness to less than one light band (11.6 millionths of an inch), micro-inch finishes of 2 to 3 RMS on all materials including cast iron, steel, magnesium, aluminum, brass, carbon, ceramics and plastics.

Crane Packing Company, 6436 Oakton St., Morton Grove, Ill. (Chicago Suburb).
In Canada: Crane Packing Co., Ltd. 617 Parkdale Avenue, Hamilton, Ontario.

Free data

These 3 booklets on Production Lapping and Light Band Reading are yours for the asking. Write today.

MECHANICAL PACKINGS

SHAFT SEALS

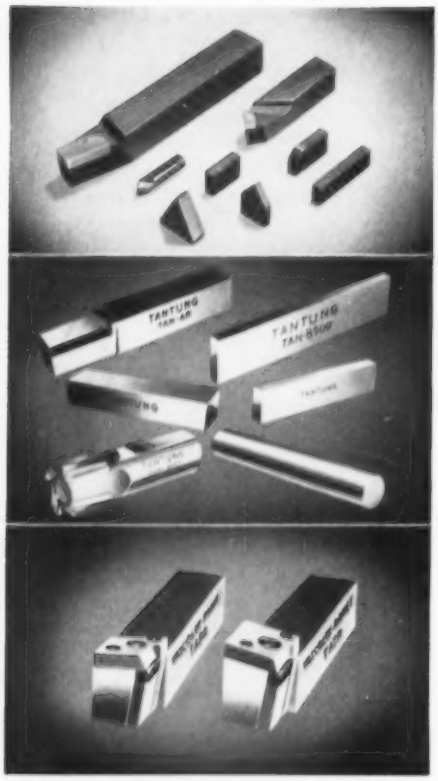
TEFLON PRODUCTS

LAPPING MACHINES

THREAD COMPOUNDS

CRANE PACKING COMPANY

How Multiple Tooling with Carbides and Tantung Cast Alloy Can Reduce Machining Costs



Surface Speed Dictates Choice of Tool

THE boring and turning operations on tool steel pictured at the right illustrate the economies possible by correct use of both carbide and cast alloy cutting tools.

To secure maximum production consistent with desired finish and tool life on the machine illustrated, the 8" O.D. is being turned at 450 surface feet per minute (215 RPM) with a V-R toolholder and throw-away carbide insert. This produces a boring speed of 112.6 SFPM on the 2" I.D. At this lower speed carbide tool life is drastically reduced by build-up, while H.S. steel tools fail prematurely because of excessive heat.

As can be seen from the Tool Selector Chart below, the answer is to use V-R Tantung cast alloy for the boring operation. The 112.6 SFPM is well within its cutting range. At this speed Tantung tool life is markedly superior to carbide or high speed steel. The reduction in regrinds and downtime results in higher production and major cost reduction.

Vascoloy-Ramet manufactures a complete line of both carbide and Tantung cutting tools to provide maximum machining economy on any job. For complete details, call your V-R Representative or Distributor or write to V-R today.

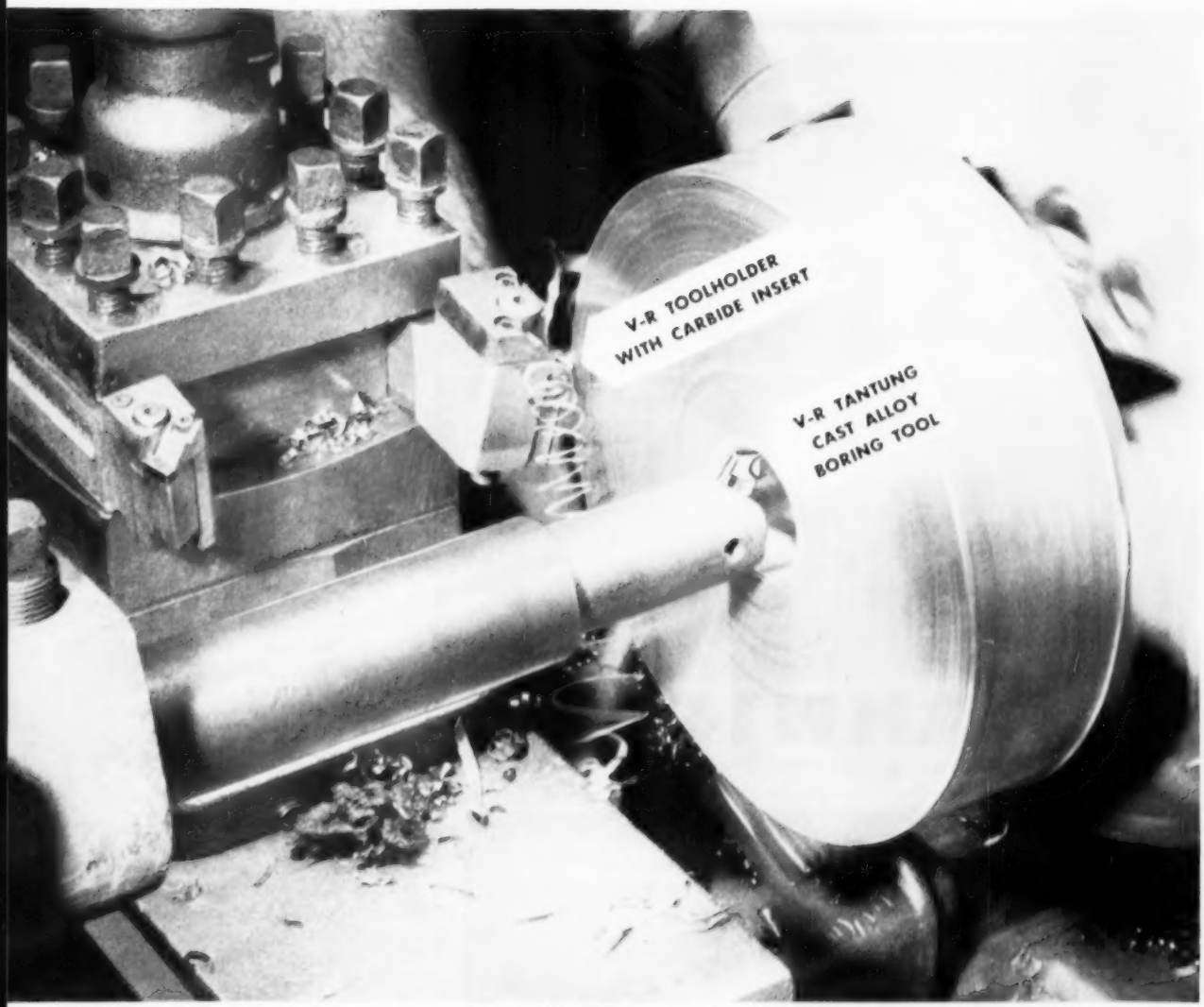
SURFACE SPEED TABLE and TOOL SELECTOR CHART

VASCOLOY-RAMET CORPORATION

	General H.S. Steel Cutting Range						GENERAL TANTUNG CUTTING RANGE						General Carbide Cutting Range								
SURFACE FEET PER MINUTE	40	50	60	70	80	90	100	110	120	140	160	180	200	250	300	350	400	450	500	600	SURFACE FEET PER MINUTE
DIA. IN	REVOLUTIONS PER MINUTE																				DIA. IN
¼	611	764	917	1070	1222	1375	1528	1681	1833	2140	2444	2750	3056	3820	4584	5348	6112	6882	7640	9168	¼
2	76	95	114	133	153	172	191	210	229	266	306	344	382	477	573	668	764	859	955	1146	2
8	19.1	24	29	33	38	43	48	52	57	66.9	76	86	96	120	143	167	191	215	239	286	8
11	13.9	17.4	20.8	24	28	31	35	38	41	48	56	62	70	87	104	122	139	156	174	208	11
12	12.7	15.9	19.1	22	25	29	32	35	38	44	50	58	64	79	95	111	127	143	159	190	12

←HIGH SPEED STEEL→ ←TANTUNG→ ←CEMENTED CARBIDE→

TO USE THIS CHART find the proper surface speed and refer to the work diameter columns at extreme right or left. The correct R.P.M. is shown opposite the work diameter to be turned.



Turning and boring normalized oil hardening Tool Steel 8" O.D. and 2" I.D.

How to Calculate Surface Feet Per Minute

GIVEN from chart at left: 215 RPM is called for to turn 8" O.D. at 450 SFPM

TO FIND surface speed of 2" I.D., use formula:
SFPM = Dia. of work x .262 x RPM
or SFPM = 2 x .262 x 215 = 112.6

Operation	SFPM	RPM	Tool	Comments
Turn 8" O.D.	450	215	Carbide	Surface speed too fast for anything but carbide.
Bore 2" I.D.	112.6	215	Tantung	Surface speed too slow for carbide, too fast for high speed steel.

FREE: Tool Selector Chart and Catalogs

CHART. The complete, handy pocket size Tool Selector Chart shown on the left hand page is available free on request without obligation. Send for your copy today.

CATALOGS. Complete data on V-R Tantung cast alloy cutting tools, Carbides and Toolholders is contained in separate catalogs available on request.

MANUFACTURERS OF
CEMENTED CARBIDES, TOOLHOLDERS and TANTUNG® CAST ALLOY CUTTING TOOLS

Vascoloy-Ramet Corporation

SUBSIDIARY OF FANSTEEL METALLURGICAL CORPORATION

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CT-581

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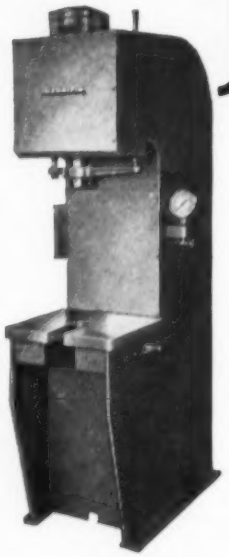
ON HANNIFIN STOCK HYDRAULIC PRESSES



1-TON	$ 552
2-TON	$ 627
5-TON	$1,306
8-TON	$1.356
10-TON	$1,855
25-TON	$3,401

Prices complete with motors and starters F.O.B. our press plant, St. Marys, Ohio, subject to change without notice.

DELIVERY FROM STOCK

Demand for these popular presses is so consistent we are able to produce them in quantity and pass the savings along to you.

Construction-wise and quality-wise these small general-purpose presses are identical to the larger Hannifin presses, up to 150 tons. Special, optional controls when needed.

WRITE for complete information on the Hannifin Hydraulic Press you're interested in.

HANNIFIN

HANNIFIN CORPORATION, 517 S. WOLF ROAD, DES PLAINES, ILLINOIS

Another of the Reasons Behind Brad Foote Quality—

DEBURRING

• Deburring of gears isn't normally included in specs or drawings. And we don't get paid for it. But here at BRAD FOOTE we take pains and expend many man hours on deburring—for we know that one tiny burr can ruin a $100,000 machine.

• Examine your next shipment of gears. See whether your present supplier is painstakingly removing all the burrs. Find out how many hours your assembly department has had to charge against deburring. See another way in which BRAD FOOTE quality and extra attention to details saves you money.

• Prove to yourself the savings that BRAD FOOTE quality can mean. Let us quote on the gear requirements for your next program—whether it be radar equipment, diesel engines, etc. BRAD FOOTE has experience in providing gears for almost every specialized application and would welcome the opportunity of discussing your gear problems.

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NEW SHOP EQUIPMENT

Ceramic Fiber Rope

Fiberfrax ceramic fiber, an aluminum-silicate material that takes heat as high as 2300 F, is available in rope form.

Thirty feet, ½ in. in diameter, weighs a pound, giving 50% more rope length than an equivalent amount of asbestos. Its resiliency makes it especially useful as expansion-joint packing and high-temperature caulking. It may also be used as insulator wrapping and for various high-temp gaskets and seals. Material is chemically inert and is unaffected by most furnace atmospheres including hydrogen.

The Carborundum Co, Niagara Falls, NY

Cutting oil, designated Magnus Cutting Compound No. 2, is said to assure accurate cuts and smooth finishes on such steels as stainless, aircraft, and alloy, allowing faster speeds and feeds. Transparent and thin-bodied, it may be used in circulating systems or applied by brush; it is applicable to both ferrous and non-ferrous metals.

Lubricants Division, Dept AM, Magnus Chemical Co, Garwood, NJ

Rotary solenoids, small torque 400 series 60 c ac, for applications calling for precise repetitive operation, operate on standard voltage with low power consumption. Continuous and intermittent-duty types are available offering 20, 30, 45, or 60° (max) rotation. Typical intermittent (40%) duty model offers 12 in.-lb torque at 115v. Solenoid closes in approximately 0.020 seconds.

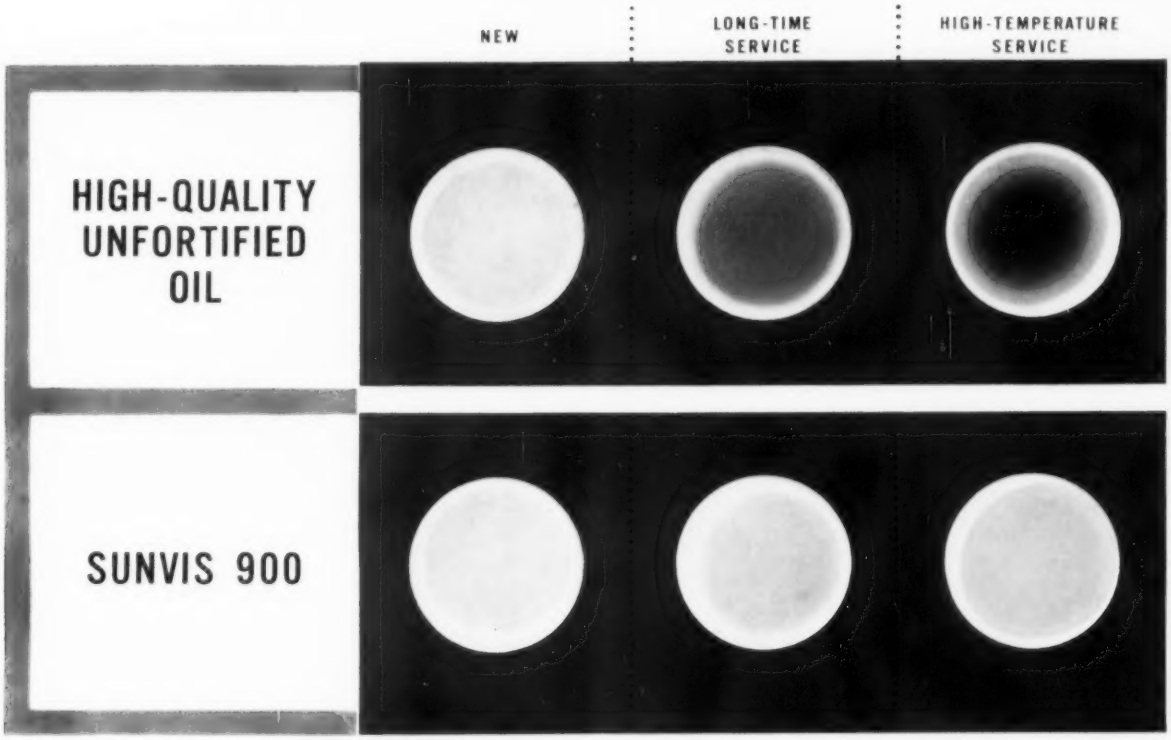
Leetronics, Inc, Dept A-3, 30 Main St, Brooklyn 1, NY

V-40 bond segments, made of aluminum-oxide abrasive grain, for grinding ferrous and non-ferrous metals are specially designed for generating flat surfaces on plates, castings, and machine parts, and grinding machine knives. Units, available in variety of shapes used in all standard chucks, incorporate a waterproof pad to assure better holding power.

Bonded Abrasives Division, The Carborundum Co, Niagara Falls, NY

Drum dolly No. 13 for vertical handling of open-end drums has load capacity up to 700 lb, is 24 in. in dia. Over-all height is 6½ in.; price, $9.90 FOB.

Morse Manufacturing Co, 755 W Manlius St, East Syracuse, NY



Oil color tests show

WHY SUNVIS 900 OILS SAVE YOU MONEY IN CIRCULATING AND HYDRAULIC SYSTEMS

Color means very little in brand new oils. But...color *change* during service can mean a lot. While minor darkening is seldom serious, radical color changes indicate danger, except, perhaps, in a highly detergent oil.

Either the oil is contaminated by foreign matter, or as in the pictures, the oil has oxidized from heat and long use. The products of oxidation darken the color of ordinary oils...clog valves and filters, cause excessive maintenance.

Compare the appearance of the used Sunvis 900 with the appearance of the other used oil. The color of used Sunvis 900 is practically the same as new Sunvis 900. There is not a sign of oxidation products.

Here's proof that Sunvis 900 oils will last longer and provide the extra needed resistance against the high temperature "hot-spots" of typical hydraulic and circulating systems. *For the long run, a Sunvis 900 oil is the most economical oil you can buy.*

For more information about Sunvis 900 oils, see your Sun representative, or write for Technical Bulletin 35. Address SUN OIL COMPANY, Philadelphia 3, Pa., Dept. I-31.

INDUSTRIAL PRODUCTS DEPARTMENT

SUN OIL COMPANY

Philadelphia 3, Pa.

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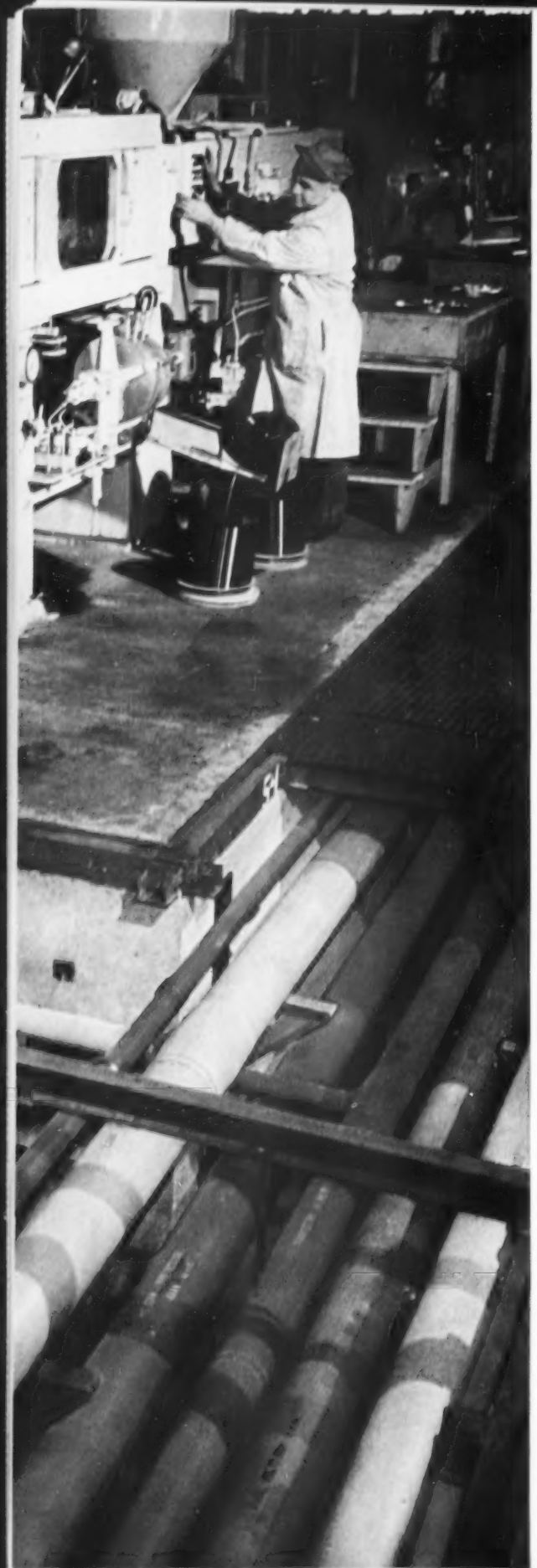
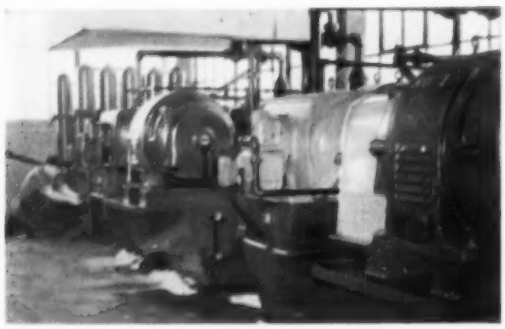
In Canada: Sun Oil Company Limited, Toronto and Montreal

SUNOCO®



High-Pressure Pumps, below, each handle 54 gpm of Sunvis 931 at 2500 psi. Unique closed-loop hydraulic system, left, features color-coded piping.



NEW CENTRAL HYDRAULIC SYSTEM PROTECTED BY SUNVIS 931 OIL

The new variable-pressure hydraulic system at Columbia Records in Bridgeport, Conn., delivers oil at 2500 psi to as many as 40 injection molding machines. Round-the-clock production of micro-groove records depends on the reliability of this system.

Columbia picked Sunvis 931 because their tests and experience have shown it doesn't form carbon or leave harmful deposits...even after years of use. Because of their long life, Sunvis 900 oils are the least expensive oils you can buy for tight circulating systems.

This is just part of the story about Sunvis 900 oils. Why not talk them over with your Sun representative the next time he calls. Or write to SUN OIL COMPANY, Philadelphia 3, Pa., Dept. I-32.

SUNOCO

INDUSTRIAL PRODUCTS DEPARTMENT

SUN OIL COMPANY

Philadelphia 3, Pa.

In Canada: Sun Oil Company Limited, Toronto and Montreal

NEW SHOP EQUIPMENT

Nylon tubing, called Nylaflow, has been designed for use on metal-working equipment in conveying lubricants, water, and plastic spray, as well as for airlines. It has ¼-in. OD with a 0.050-in. wall and a burst rating of 2500 psi. Advantages are flexibility; high resistance to flex fatigue and abrasion; unaffected by alkalis and practically all solvents.

Polymer Corp of Pennsylvania, 125 N Fourth St, Reading, Penna

Paint booth coating, Oakite Shield, is said to strip off in large pieces in seconds. Applied by spray or brush, it is odorless, non-toxic, and non-hazardous to store and use.

Oakite Products, Inc, 157 Rector St, New York 6, NY

Adjustable bore gages trademarked Hutto are now hard-chrome-plated. Double-end devices, one end set to "go" tolerance, the other to "no-go," are available in fifteen standard sizes covering a range of from 0.995 to 6.005 in.

Maxwell Co, Macedonia, Ohio

Steel lathe cabinet designed for use with Derbyshire Model 750 instrument lathe (*AM*—Feb 28 '55, p170) has a top surface 48-in. in length and 21 in. deep. Over-all length is 54 in. Compact cabinet is equipped with a chip drawer.

F W Derbyshire, Waltham, Mass

Mathematical charts, furnished on heavy 8½ by 11-in. card stock, consist of a log scale superimposed diagonally upon log log grid. Called Calculines, charts include scales for multiplication and division as well as scales for obtaining directly the square root, cube root, and logarithm of a number. Values can be read directly without the use of a straight edge.

Frederick Post Co, 3666 N Avondale Ave, Chicago 18, Ill

Right-angle gear drives in U S Holloshaft line have been increased in number, so that sizes range from 11 to 150 hp in a wide selection of gear ratios and speeds. Drives are adaptable to any vertical-turbine pump and are driven by gas, gasoline, or diesel engine. Features of line include automatic oil circulation, weatherproof construction, and heat-treated castings.

U S Electrical Motors, Inc, Box 2058, Terminal Annex, Los Angeles 54, Calif

SPECIFY ADAMAS PREMIUM GRADE 548

for all finishing and semi-roughing on tough alloy steels, with or without interrupted cuts

- MORE WEAR RESISTANT
- MORE SHOCK RESISTANT
- GREATER STRENGTH
- RESISTS CRATERING

Formulated specifically for finishing and semi-roughing operations on high alloy steels, ADAMAS PREMIUM GRADE 548 is the hardest carbide grade used successfully on interrupted finishing cuts.*

When encountering cratering in machining the 300-series stainless steels with straight tungsten carbide grades, change to ADAMAS PREMIUM GRADE 548. You will get far more crater resistance without sacrificing edge wear resistance.

Particularly suitable for application on automatic machines, ADAMAS PREMIUM GRADE 548 is excellent where some shock and excessive edge wear are encountered on light cuts.

*For continuous cuts on low carbon steels, use ADAMAS standard grades C and D.

SPECIFY ADAMAS PREMIUM GRADE 548 FOR... MORE CHIPS AT LOWEST COST!

ADAMAS

ADAMAS CARBIDE CORPORATION, KENILWORTH, NEW JERSEY

FOR *Fast, Low Cost* DRILLING OF HARDENED STEEL, USE

ACE

"HI-BRINELL" DRILLS

When it comes to drilling hardened ferrous materials in the range of 45 to 65 Rockwell "C" and harder, you can't beat Ace "Hi-Brinell" Drills. They're designed especially to handle tough jobs that ordinary drills won't touch. Ideal for salvaging and repairing hardened steel parts . . . a "must" for every tool room, die shop, machine repair department. They're built to give you extra long service life, too. The tungsten carbide tips have ample negative rake to eliminate thin projecting angles and permit faster, easier cutting. And they're stocked in a wide range of sizes and lengths to meet your particular requirements. Call your Ace Distributor or send for complete information today!

ACE DRILL CORPORATION
Adrian, Michigan

Gentlemen: Please send me your Catalog No. 52-A containing complete information on ACE "Ground-from-the-Solid" Drills and hardened H.S.S. drill blanks.

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CITY _____ STATE _____

ACE DRILL
ADRIAN, MICHIGAN

ORIGINATORS OF "GROUND-FROM-THE-SOLID" DRILLS

NEW SHOP EQUIPMENT

Pilotair valve for use in pneumatic control systems, called Model D, is of ¼-in. size, and supplements previously announced ½-in. model. Valve features sectionalized construction which reportedly permits over 3000 two-, three-, and four-way valves to be assembled from a few basic parts. Valve can be used in systems with pressures as high as 250 psi and temperatures as high as 200 F.

Industrial Products Div, Westinghouse Air Brake Co, Wilmerding, Penna

MistOmatic spray control provides a means of applying a controlled, premeasured quantity of mist lubrication on open gears, chains, cams, rollers, eccentrics, slides and ways, circular saws, and similar surfaces. System incorporates an injector spray control valve, lubricant injector, pneumatic atomizing nozzle, and air and lubricant lines.

Lincoln Engineering Co, Industrial Div, 5703-27 Natural Bridge Ave, St Louis 20, Mo

Meletron pressure switch, designated Model 432, comes in three classes of proof pressures—6, 30, and 120 psi—with an adjustable range from 0.05 to 100 psi. Device may be used to signal when pressure rises or falls to danger zone and then to shut down the system if pressure continues to rise or fall to a predetermined safety limit. Manual reset is so arranged that system cannot be reactivated until the pressure has been returned to a safe level. List price is $27.90. Bulletin 432.

Barksdale Valves, Pressure Switch Div, 5125 Alcoa Ave, Los Angeles 58, Calif

Pump-Operated Oiling System

Style DTP pump-operated dispenser, designed for feeding oil under pressure to elevated, distant, and inaccessible points for distribution through suitable control valves, consists of the following components: steel tank with liquid-level gage, belt-driven motor pump with bypass valve and pressure gage, oil filter, and check valve. All equipment is mounted on a stand and comes ready for operation.

Pump has a rated capacity of 10 gph and is driven by a 1/6-hp motor. Over-all dimensions of the dispenser are 19½ x 14 x 16 in. Complete line of accessories is offered.

Oil-Rite Corp, 2386 Waldo Blvd, Manitowoc, Wis

machines last longer...

Priced from 190.00

wear reduced as much as **80%** with easy-to-move

TORIT DUST COLLECTORS

Dust causes wear, damages bearings, bedways, slides and saddles and other "sensitive" machine parts. Clean machines hold close tolerances better and need re-grinding or alignment only ⅕ as often. In five years, users of Torit dust collectors save up to $1,600 in re-grinding the ways of the average grinder—and save hundreds of dollars *more* in down-time.

MANY COMPACT MODELS . . . all self-contained. Unitized for custom installation. More economical, usually more efficient than central (built-into-the-building) systems. For more information, write today to . . .

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MANUFACTURING COMPANY

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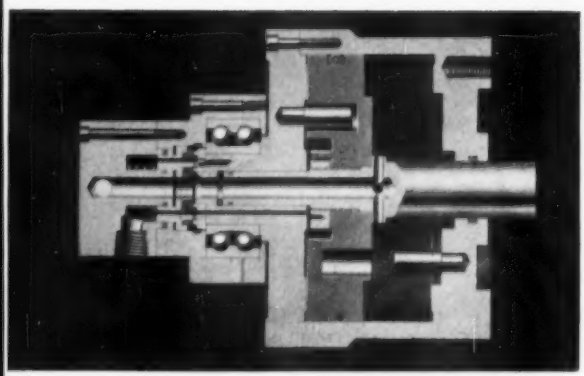
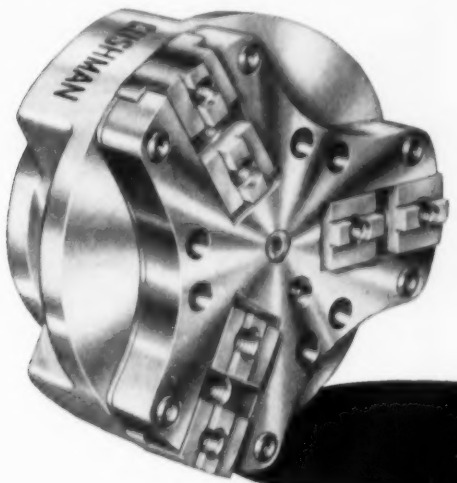
Dept.
311 Walnut Street,
St. Paul 2, Minn.

CUSHMAN chucks give Chuck-ability

CHUCK-ABILITY: The ability to SPEED your work . . . ELIMINATE fatigue . . . IMPROVE your products . . . and REDUCE your costs . . .through design and selection of the right work-holding devices.





Typical Cushman Air Operated Chucks and Cylinders for repetitive machining operations permitting increased production at lower costs.

the key to machining efficiency

Today's repetitive manufacturing demands *efficient* and *economical* operation of high speed machine tools. Cushman Air Operated Chucks and Cylinders give you **Chuck-ability** with satisfactory performance under the punishment of constant day-in and day-out service . . . no loss of chuck or cylinder efficiency over a long service life . . . no air leakage problems . . . and the feature of *quick* loading and unloading of workpieces at the touch of foot or hand.

Chuck-ability is available to you in Cushman's complete line of manually and air operated precision chucks, designed and manufactured to meet today's high metal working quotas at lower production costs.

Write today for catalogs fully describing Cushman Chucks. Or, should you have a particular work-holding problem, Cushman can give you **Chuck-ability** in a special chuck, designed and engineered to your requirements.

THE CUSHMAN CHUCK COMPANY • Hartford 2, Connecticut

a world standard for precision

CUSHMAN the CHUCKMAN CHUCKS AND ACCESSORIES Exclusively SINCE 1867

CUSHMAN CHUCKS . . . A Product of American Quality, Labor and Materials

SEE YOUR INDUSTRIAL DISTRIBUTOR

manufacturers of:

Air Operated Chucks, Cylinders, and Accessory Equipment . . . The Cushman Power Wrench . . . Cushman Manually Operated Chucks and Face Plate Jaws

3CS55A

Memo that kept a production line running!

MEMO:

TO: Production — Bill H.

FROM: Purchasing

Bill — Regarding that carbide drilling + reaming problem you called about — I've checked carefully and am calling in a Chicago-Latrobe service-engineer. I understand they are top trouble shooters on this kind of job.

Good — you've called the right man

J.R.

Bill H.

Chicago-Latrobe makes carbide drills and reamers of a quality that is unsurpassed—in a complete line—and backs these tools with the kind of service that keeps the production line running. Try them and see.

Chicago-Latrobe

CARBIDE DRILLS and REAMERS

DOUBLE CIRCLE TOOLS

Stocked and sold by *service-minded* Industrial Distributors

CHICAGO-LATROBE

416 W. ONTARIO STREET • CHICAGO 10, ILLINOIS

NEW SHOP EQUIPMENT

Automatic equipment control called Auto-Set, said to be adaptable to almost any machine, automatically sets the machine to the correct repeat and holds it there. At the same time it indicates to the operator if the repeat is longer or shorter than the desired length. Device accomplishes this by electronically comparing the unit length desired with that actually being delivered; if they do not agree, control will change machine setting to deliver the proper unit length. Device consists basically of a photo cell, an amplifier control panel, and a detector, and operates by comparing web travel to a fixed reference point with the degree of completion of the repeat cycle of the machine at the same instant.

Machine O'Matic, Inc, 2045 N Hoyne Ave, Chicago 47, Ill

Part numbering units called Unimark have individual interchangeable numbers, emboss both part numbers and letters, at the same time performing hole-punching and notching operations in work. Units can be used in conjunction with any combination of perforating and notching units in the same setup on T-slotted plates, templets, or rails in presses and brakes. Units are available with 8⅜-in. shut height with 3½-in. die height, or 5½-in. shut height with 2 19/32-in. die height. Catalog PN.

Punch Products Corp, 3800 Highland Ave, Niagara Falls, NY

Platecoils, heat-transfer units designed to replace pipe coils in industrial processes requiring the application or removal of heat, have been made available in several special alloys to extend their application in corrosive, highly acid, and other specialized industrial processes. Units consist of two embossed metal sheets welded together to provide a preformed channel for the flow of heating or cooling media. Alloys available are Type 316 stainless steel, Monel, Carpenter 20, Hastelloy B and C, and nickel.

Tranter Mfg Co, Inc, Platecoil Div, Lansing 4, Mich

Hardened-gear dial indicators designed for production-line inspection are shockproof and made to stand up under heavier-than-ordinary use. Internal friction in gear movement is said to have been reduced up to 25%. Instruments are available in four sizes—from 1 11/16

Pour savings into your shop with

GULFCUT

cutting oils

Gulfcut is the new brand name for Gulf's complete line of modern, up-to-date cutting fluids. Each Gulfcut oil is scientifically compounded to meet the most exacting requirements for tool life, accuracy of work, and surface finish.

This new line of Gulfcut oils includes mineral-lard oils, sulfurized-mineral oils, sulfurized-mineral lard oils, sulfochlorinated-lard oils, and emulsifying oils—outstanding cutting oils that contribute to better results in every metal cutting operation.

Have a Gulf Sales Engineer show you how one or more of the Gulfcut line of cutting oils can help you get increased tool life and lower machining costs in your shop. Consult the telephone directory for the number of your local Gulf office.

Gulf Oil Corporation • Gulf Refining Company
1822 Gulf Building, Pittsburgh 30, Pa.

THE FINEST PETROLEUM PRODUCTS
FOR ALL YOUR NEEDS

NELCO CARBIDE TIPPED MILLING CUTTERS . . . CUT YOUR OVERHEAD!

You DON'T grind steel with a diamond wheel—when you use NELCO Cutters!
All carbide cutting surfaces overhang steel body!
NELCO sandwich braze guarantees a rugged, one piece cutter that works to close tolerances, can't chatter, teeth don't work loose!
NELCO pioneered slash milled design—gives more chip clearance—means less grinding—gives greater production between grinds!
Gang cutting made simple—slot, maintain width with multiple cutters and shims!

Those who buy tools for lasting performance as well as initial appearance always specify "Nelco". These carbide tipped Milling Cutters are precision built for rugged dependability, engineered to "take it"—singly or in gangs—to save *real money*, deliver fast and accurate results without the operational and maintenance "headaches" of most conventional cutters. Look for benefits *and* appearance—call for Nelco—your distributor has the size and type you need in stock.

SEND TODAY for 24 page manual—Suggestions for Operating and Maintaining NELCO TOOLS! Contains illustrated instructions for regrinding with operating charts and data.

NELCO TOOLS *For that EXTRA Edge in Production!*

NELCO TOOL CO., Inc. • Manchester, Conn.

to 3⅝ in. in diameter—as well as in long-range and wetproof models.

Federal Products Corp, 1144 Eddy St, Providence 1, RI

Bronze globe valve, designated LQ600-200, is rated at 200 lb steam pressure and 400 lb water, oil, and gas pressure. Body and bonnet are made of Lunkenheimer S-1 bronze; seats and disks are of Brinalloy, said to exceed wear resistance of 1000-Brinell case-hardened stainless steel. Seats and disks are lapped to obtain a smooth, flat, leak-proof seal.

Lunkenheimer Co, Box 360, Cincinnati 14, Ohio

Nylon fitting called the Zytel Miracle Fitting is designed in only two pieces, does not require flaring of tubing or exact tube length for its use. Guaranteed not to crack or leak under normal conditions, device is 1/17 the weight of brass, has a temperature range from –70 to +295 F, and provides a seal which is said to withstand pressure up to 500 psi. Fitting is available in sizes from 1/16 to ½ in. in all variations. Other sizes can be quoted.

Jaco Mfg Co, P O Box 2659, Cleveland 7, Ohio

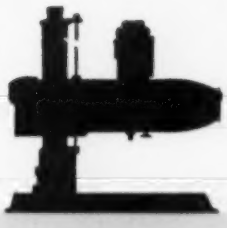
Workhead and belt-guard assembly of Delta cut-off machine is offered as a separate package for use in building special-purpose machine. Head can cut 1¼-in. ferrous tubing with a 5/32-in. wall and ferrous solid stock up to ¾-in. diameter. Arbor speed with a 1725-rpm motor and 6-in. motor pulley is 4000 rpm, or 2000 rpm with a 3-in. pulley. With a 10-in. blade, cutting speed is 10,500 fpm, or 5250 at the lower arbor speed.

Delta Power Tool Div, Rockwell Mfg Co, 449 N Lexington Ave, Pittsburgh 8, Penna

High-temperature insulating castable known as Alundum 33-I is reported effective in providing insulation against temperatures up to 3300 F. Material is lightweight and monolithic in structure, having an aluminum-oxide content of about 96%. It is made up of pure alumina bubbles in the range of 6-mesh and finer. One 100-lb bag when mixed with water and poured forms one cu ft of refractory.

Norton Co, Refractories Div, Worcester 6, Mass

Electrode and filler rod and wire are designed for welding company's Ni-o-nel alloy, which contains approximately 40% nickel, 21% chromium,



NEW HEAD CONTROLS make Fosmatic Radial easier than ever to run!

Numerical Dials select feeds and speeds quickly, easily, with minimum possibility of error. Select even while drill is running, to save time on next operation.

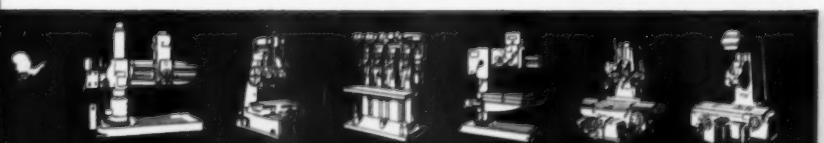
Single Control Lever starts, stops, reverses and shifts to feed and speed set on numerical dials.

Push Buttons on quick return levers engage feed. Feed is disengaged automatically by depth control or by pushing either button again. Magnetic clutch needs no adjustment.

Head Traverse Lever also elevates arm. Variable speed hydraulic motors drive both traverse screw and elevating nut. Clutches eliminated.

Other Fosmatic features include: 36 spindle speeds, 18 feeds, 4' to 8' arms, 13" to 19" columns, Boring Type Spindle, Safety Interlocks, Variable-Tension Counterbalance for Spindle, and optional Milling Feed

NEED DRILLING EQUIPMENT? GET A PROPOSAL FROM FOSDICK!



THE FOSDICK MACHINE TOOL CO., CINCINNATI 23, OHIO

FOSDICK

You can acquire a new 4" Table Type machine for as little as $1.71 an hour. If you operate two 40-hour shifts, by using Gilbert's new financing plan: 6% simple interest (3% add on); up to 5 years to pay. (These prices are subject to change.) 3½" and 5" Table Type machines cost even less to own.

new 4" and 5"

THE FOSDICK MACHINE TOOL CO., CINCINNATI 23, OHIO

Every modern feature that can reduce floor-to-floor time is built into these new Gilbert 4″ and 5″ boring mills.

For one example, your operator can preselect speeds and feeds, and power automatic shifting takes over from there. For another, the pushbutton station makes his job easier and reduces his machine-handling time. This controls start, stop, and reverse for spindle; spindle electric clutch and brake; reverse for all feeds; forward, reverse power rapid traverse; spindle and milling feeds and rapid traverse; back gear clutch on spindle sleeve; milling feeds to head, table, and saddle (table type), or head and column (floor type); spindle feed electric clutch; power clamp, head to column (table type) or to head and base-to-runway (floor type); and automatic positioning, if ordered.

The built-in reversible motor (up to 20 hp) on the head puts maximum power to the tool; there are no long drive shafts. Speeds up to 1,500 rpm are standard.

The Cincinnati Gilbert Machine Tool Co.
3366 Beekman Street, Cincinnati 23, Ohio

those who buy
GILBERT
buy Gilbert again

boring mills

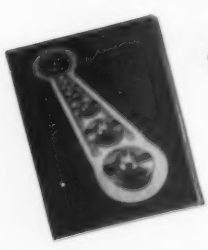
60 CALIBER LINKS FOR THE HIGHEST CALIBER PRODUCTION!

Stations by the dozens . . . tolerances to the ten thousandths . . . production in the millions . . . with progressive dies by

B. Jahn

60 caliber single and double loop links . . . produced by the millions — and hundreds of millions — and all must be absolutely identical, accurate! These stringent specifications demand the finest dies and diemakers — that's why B. Jahn was selected. The master toolmakers and engineers at B. Jahn built a 13 station and 16 station progressive die that formed the intricate components from heavy SAE — 1055 steel. Million plus runs . . . precise fidelity . . . and lasting economy . . . were engineered into every die — and verified by "production proving" in the B. Jahn plant before delivery. Whatever your product, your problem — B. Jahn die making ingenuity can help you deliver better goods . . . in less time . . . at less cost.

Die ribbons showing 13 and 16 stations necessary in producing tremendous runs of shell loop links!



NOW AVAILABLE! The brand new B. Jahn brochure — lavishly illustrated — colorful — fact-packed! Send for your copy today!

B. Jahn

THE B. JAHN MANUFACTURING COMPANY, NEW BRITAIN, CONNECTICUT

3% molybdenum, 31% iron, 1.75% copper, and small amounts of manganese, silicon, and carbon. "135" electrode comes in 14-in. lengths and is made in diameters of 3/32, ⅛, 5/32, and 3/16 in. "65" filler wire is produced in diameters of 0.035, 0.045, and 0.062 in., for inert-gas welding consumable process. Rod is available in five diameters between 1/16 and 3/16 in., each 36 in. long.

International Nickel Co, Inc, 67 Wall St, New York 5, NY

Neutral attachment for all double-solenoid Speed King valves provides full control of double-acting cylinders and similar devices. Attachment, which consists of stop plungers in extensions mounted at the ends of the valve body, uses air power to provide positive mechanical centering of the main valve stem in neutral position. Self-contained within valve assembly, device operates without use of mechanical springs on the main valve stem. Kit for installing attachment on Speed King valves now in use is available.

Valvair Corp, 454 Morgan Ave, Akron 11, Ohio

Self-aligning tube fitting called Selfalign can be installed without disassembling: tubing is inserted in the fitting until it bottoms and the nut is tightened. Sleeve grips tubing over a broad area for a surface-to-surface seal, while a thin razor edge and guiding shoulder form a line-to-seal with the tubing as nut is tightened. Sizes of ⅛, 3/16, ¼, 5/16, ⅜, and ½ in. in brass are available from stock; aluminum fittings are offered on special order.

Weatherhead Co, Fort Wayne Div, Fort Wayne, Ind

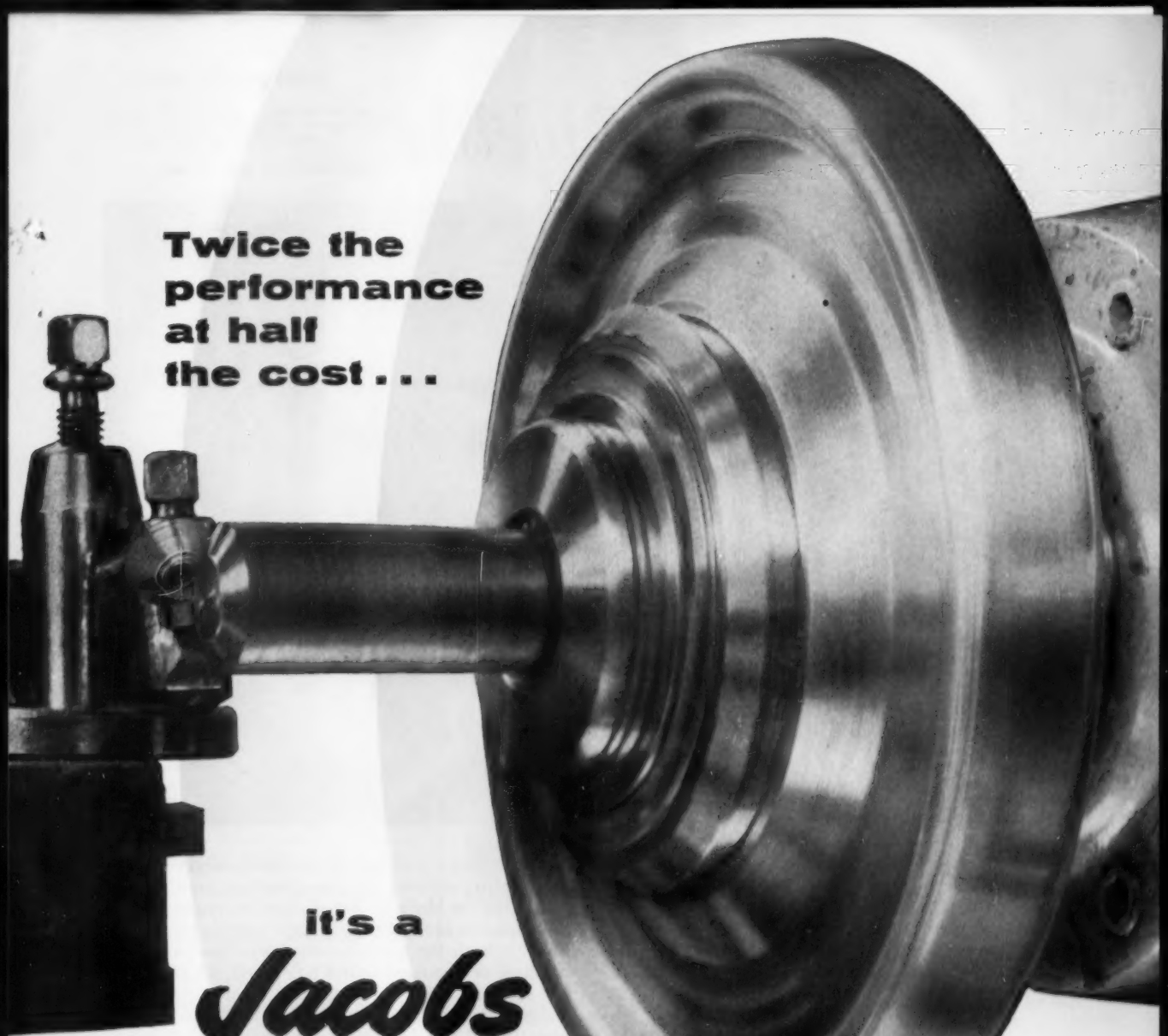
Free Literature

To order any of these bulletins, please use cards at start of this section—page 168e.

MACHINES AND ATTACHMENTS

34 KELLER DIE FILER—*Sales Service Machine Tool Co, St Paul 14 Minn.* 4-page bulletin 256 illustrates and describes three models for filing, sawing, and lapping operations. Material included on parallel machine files, metal cutting saw blades, abrasive stones and lapping sticks, and accessories.

35 ROTARY TABLE MARKING MACHINE—*Jas H Matthews & Co, Pittsburgh 15, Penna.* 4-page illustrated brochure contains information on No. 201 high-speed unit for marking cylindrical or



Twice the performance at half the cost . . .

it's a *Jacobs* CHUCK

Jacobs and your industrial supply distributor are ready to deliver the chucks you need and the service you deserve. First in chucks . . . first in service.

THE JACOBS MANUFACTURING COMPANY • WEST HARTFORD, CONN.

The Jacobs Plain Bearing Chuck for drill presses, portable electric and air tools.

The Jacobs Rubber-Flex® Tap Chuck for tapping heads and impact tools.

The Jacobs Model 96 Collet Chuck for grinding machines, millers and jig-borers.

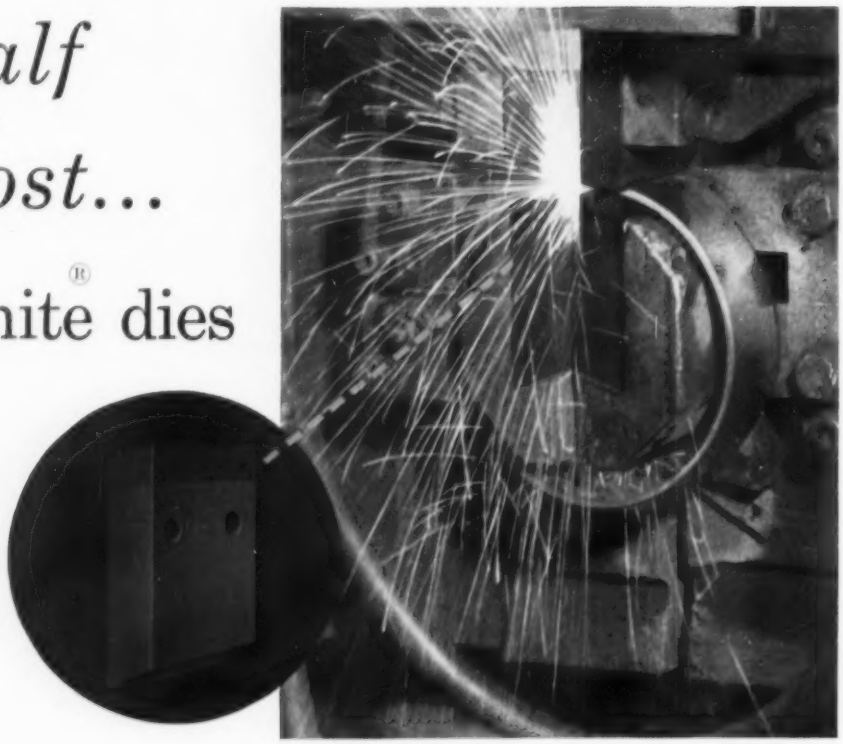
The Jacobs Ball Bearing Super Chuck for heavy duty and precision industrial use.

The Jacobs Model 91 Spindle Nose Collet Chuck for tool room and engine lathes.

The Jacobs Impact Keyless Chuck especially designed for the aircraft industry.

4 *times more welds ...at half the cost...*

with Elkonite® dies



Die insert for this flash and butt welding machine is faced with Elkonite 10W53 . . . a dense, hard material with high resistance to arc erosion, high strength and good electrical conductivity. The backing material is Mallory 53 alloy.

On the flash butt welding of transmission brake bands, a large manufacturer of automatic transmissions has made real improvements in the economy and volume of production . . . by the use of Mallory engineered die inserts faced with Elkonite alloy. Here are the actual production results:

Electrode life quadrupled. Elkonite-faced inserts produce over 32,000 welds . . . in contrast to 8000 with the previous type of dies.

Down time reduced 75%. Longer runs between dressing cut machine down time . . . helps in maintaining high production rates.

Lower cost per weld. Cost of die insert material per weld is *less than half* what it used to be.

You can find a cost-saving, production-boosting solution to your own resistance welding problems by calling on Mallory. An unequalled variety of electrodes in scores of shapes and sizes are available . . . with the exclusive Mallory fluted cooling hole or standard round hole. You can count on Mallory, too, for electrode holders, seam welding wheels, castings, forgings and dies. The selection of standard designs covers most of the welding work you will encounter. For special requirements, your nearby Mallory welding distributor will be glad to aid in your selection . . . or our staff of welding specialists will give your problem the benefit of our years of experience in the welding field.

For the latest technical data on the Mallory line, write to us for a copy of the Mallory Resistance Welding Catalog.

Expect more . . . Get more from

P R MALLORY & CO Inc.

MALLORY

P. R. MALLORY & CO., Inc., INDIANAPOLIS 6, INDIANA

In Canada, made and sold by Johnson Matthey and Mallory, Ltd., 110 Industry Street, Toronto 15, Ontario

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For information on titanium developments, contact Mallory-Sharon Titanium Corp., Niles, Ohio

Free Literature

cone-sharped parts at 6000 to 7000 per hr. Features and operational principle illustrated; specifications included.

TOOLS AND ACCESSORIES

36 MOLYKOTE LUBRICATION—*Alpha Molykote Corp, Stamford, Conn.* 4-page brochure discusses press fitting with molybdenum disulfide lubrication. Covers plain bearings, ball and roller bearings, gears, sprockets, clutches, and flywheels. Includes delineation of the mathematics of press fits. Advantages and applications described.

37 MILLING CUTTERS—*Wesson Co, Ferndale 20, Mich.* 6-page bulletin C-85 covers cutters utilizing throw-away inserts which are indexed eight times and discarded.

38 AIR GAGING—*Taft-Peirce Manufacturing Co, Woonsocket, RI.* 4-page illustrated folder deals with automatic gagging as applied to mass production automation operations. Covers semi-automatic and manual applications as well. Features of CompAiramatics described.

39 DRILLS AND REAMERS—*Chicago-Latrobe, Chicago 10, Ill.* 4-page folder contains illustrated description and dimensions of carbide-tipped Harduty units for drilling in hardened die steel 45 to 65 R_c, and reamers for use in hardened steel having 45 R_c or harder.

40 ELECTRONIC TEMPERATURE CONTROLLER—*Minneapolis-Honeywell Regulator Co, Philadelphia 44, Penna.* 4-page specification sheet S1010-1 illustrates and describes Model 077, a non-indicating device which operates on the balanced bridge principle. Can be supplied as a single point controller, differential controller, or for cascade control.

41 O-RING LUBRICATION—*Parker Appliance Co, Cleveland 12, Ohio.* 4-page catalog 5840 describes O-Lube, a grease applied to both the synthetic rubber O-ring and the metal surfaces over which it must slide. Material is especially recommended for low pressure pneumatic and vacuum systems.

42 VIBRATORY PARTS FEEDERS—*Perry Equipment & Engineering Co, Erie, Penna.* 8-page illustrated catalog 356 gives data on equipment for automatic small parts feeding; any size up to 3 in., any shape or material. Specifications and accessories covered.

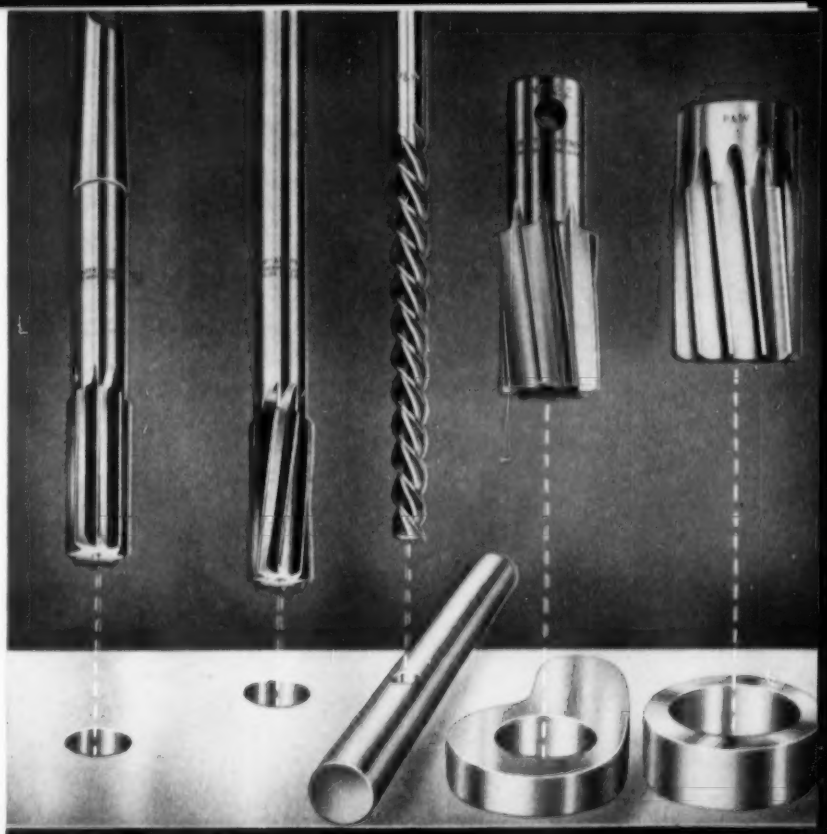
HEAT TREATING AND WELDING

43 ELECTRIC RESISTANCE WELDING—*Sciaky Bros, Inc, Chicago, Ill.* 12-page bulletin 331, Designer's Guide, describes and illustrates advantages and techniques. Spot, seam, projection, and flash-butt welding discussed.

44 QUENCHING OIL—*Sun Oil Co, Philadelphia 3, Penna.* Technical bulletin 45 gives data on Sunquench 78, said to give deeper and greater hardening of low-alloy steels and reduced distortion of irregularly shaped parts. Mechanism of quenching explained.

45 SNAP HEARTH FURNACE—*Surface Combustion Corp, Toledo 1, Ohio.* 4-page bulletin SC-173 contains information on first suspended hearth type with radiant tube heating for controlled atmosphere heat treating and quenching of small parts. Diagrams, curves, applications illustrated.

46 TEMPERATURE CONTROL—*Leeds & Northrup Co, Philadelphia 44, Penna.* 2-page illustrated process data sheet 620(2) gives complete information on small-target, high-speed Rayotube detector and Speedomax G controller for high frequency induction heating. Specifications and standard ranges tabulated.



PRATT & WHITNEY
Quality REAMERS

for the long run . . .

because they run longer!

When you buy reamers, you're *really* buying the number of smooth, round, accurate holes each tool will produce. That's why Pratt & Whitney Reamers – cutting smoother, faster and longer – are your best buy in the long run. From the start (with selected steels and proved-correct design) . . . to the finish (the distinctive P&W special surface treatment) . . . they're quality *all the way!*

Pratt & Whitney manufactures complete lines of reamers for every industrial application . . . and you can select standard types and sizes from on-the-shelf stocks at Pratt & Whitney Branches. Hardened blanks are carried in stock for quick delivery on non-standard sizes.

FOR COMPLETE INFORMATION . . . write for free product literature stating the reamer types you're interested in.

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Branch Offices and Stocks in Principal Cities

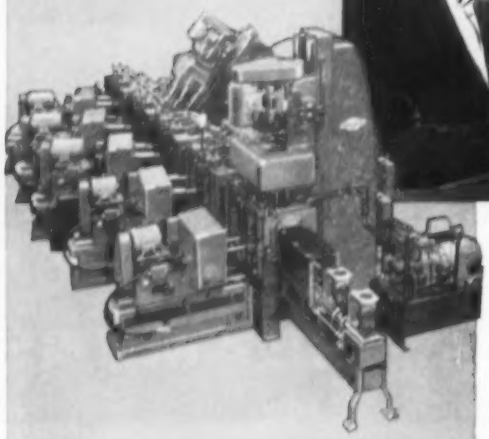
MACHINE TOOLS • GAGES • CUTTING TOOLS

GREENLEE OFFERS

A PROFIT-MAKING INVESTMENT IN HIGH-PRODUCTION MACHINE TOOLS

Greenlee Six-Spindle Automatic Bar Machine.

Greenlee 22-Station Automatic Transfer Machine for machining transmission cases.



Greenlee 10-Station Automatic Transfer Machine.

Greenlee creative thinking, Greenlee engineering and Greenlee experience combined with that of your own engineers will help you "produce more at lower cost."

Ideas, engineering, experience and facilities of Greenlee Bros. & Co. develop improved methods and machines for greater and greater productivity of future models.

Greenlee's adequate facilities expedite the transition from production ideas to production machines . . . a profit-making investment at work in your plant.

GREENLEE STANDARD AND SPECIAL MACHINE TOOLS

- Multiple-Spindle Drilling and Tapping Machines
- Transfer-Type Processing Machines
- Six and Four-Spindle Automatic Bar Machines
- Hydro-Borer Precision Boring Machines

Write for Further Information

GREENLEE

GREENLEE BROS. & CO.
1726 Mason Ave.
Rockford, Illinois

Free Literature

47 WELDING EQUIPMENT—*General Electric Co, Schenectady 5, NY.* 8-page catalog GEA-6028A describes and illustrates Fillerarc equipment for high-speed, lowcost production welding of metals by consumable electrode gas-shielded process.

PLANT SERVICE EQUIPMENT

48 ELECTRONIC AIR CLEANERS—*Trion, Inc, McKees Rocks, Penna.* 12-page catalog E-61 contains complete engineering data, size and capacity tables, and component parts description of units installed in ventilating system air returns.

49 RUST PREVENTIVES & COATINGS—*F E Anderson Oil Co, Portland, Conn.* Comprehensive data sheet describes 12 products for variety of uses from work in process to packaging and shipment.

50 WIREBOUND BOXES & CRATES—*Wirebound Box Manufacturers Association, Chicago 4, Ill.* 8-page brochure covers materials handling, stacking, and warehouse applications. High stacking of heavy loads illustrated, as well as palletizing of packed containers, and wirebound pallet bins in use.

51 AUTOMATIC DRYERS—*Murphy & Miller, Inc, Chicago 5, Ill.* 4-page illustrated circular describes units for compressed air and gases. Features and operating details covered.

PARTS AND MATERIALS

52 WELDED CHAIN & ASSEMBLIES—*Republic Steel Corp, Cleveland 27, Ohio.* 62-page catalog ADV-701 describes and illustrates 25 different types plus complete line of accessories. General information section includes maintenance and ordering data.

53 MOTOR CONTROL UNITS—*Federal Pacific Electric Co, Newark 1, NJ.* 28-page engineering bulletin 2-2000 gives illustrated description of construction details and components. Includes dimensions and bus location data, mounting arrangements.

54 LOW-TEMPERATURE-MELTING ALLOYS—*Cerro de Pasco Corp, New York 5, NY.* 4-page folder lists 63 applications including design—in anchoring nonmoving parts in machinery; pattern and model reproduction; punch and die part anchorage; and holding workpieces of thin or irregular section.

55 ALUMINUM SCREW MACHINE STOCK—*Reynolds Metals Co, Louisville 1, Ky.* 4-page brochure, Form D 22-25-1255, outlines advantages. 12-page aluminum machining data booklet, D-23-25-1255, gives information on feeds and speeds from forming and drilling through trepanning. Includes rules for calculating cutting speeds and for figuring thread rolls, and cutting speed conversion table.

56 KNITTED ALLOY WIRE PRODUCTS—*Alloy Metal Wire Division, H K Porter Co, New York 17, NY.* 8-page bulletin A-1 illustrates and describes applications for knitted stainless steel and nickel alloy wire, including filters, shock absorption cushions, and electronic weatherstripping.

57 POLYESTER LAMINATE—*Glastic Corp, Cleveland 21, Ohio.* Bulletin describes fiberglass-reinforced Glastic sheet stock, said to have improved electrical and mechanical properties. Information given on variety of grades and applications.

58 SUBMINIATURE SWITCHES—*Micro Switch, Division of Minneapolis Honeywell Regulator Co, Freeport, Ill.* 16-page catalog 75a illustrates and describes wide variety of basic switches, toggle assemblies, rotary selector switches, and pushbutton assemblies.

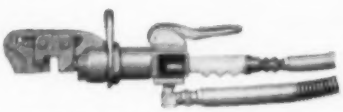
NEW DESIGN

MANCO Hydraulic Guillotine®

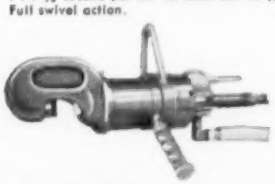
WIRE AND ROD CUTTERS

Big Capacity

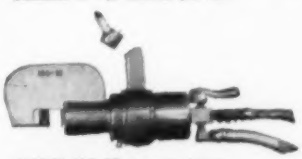
FAST • EASY TO USE



MODEL MC 210 Capacity ⅛" High speed . . . ½ second per cut for steel rod to ⅛". Full swivel action.



MODEL MC 35 Capacity 1" Cuts high carbon material including reinforcing rod and heat treated chain to 1" diameter in 1¼ seconds per cut.



MODEL MC 65 Capacity 1¼" Cuts 1¼" diameter steel in 2 seconds per cut. Can be modified to cut 1⅝" diameter aluminum.

Big Time and Money Saver for Rod Mills and Users of Wire and Rod

Ideal for production cutting, trimming off cobbled ends, taking test samples and splitting bundles on docks.

Manco has completely redesigned the Guillotine line of wire and rod cutters now used by major rod mills throughout the world. These new Manco Guillotine units give high efficiency, heavy duty performance, with a 75% slash in tool maintenance costs.

New Interchangeable Blade and Anvil

Interchangeable blade and anvil means wear points can be reversed for virtually double life. Three blade styles for various cutting requirements. There is a new simplified valve design with hardened and ground parts for longer life. Also, new Meehanite piston with large bearing surface and a new piston seal assembly that permits quick replacement.

These Guillotine units powered by Manco Hi-Thrust Electric Hydraulic Pumps

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Important Note: Also ask about trade-in offer on old model 200 HV-2L, 20 HV-1 and 21 HV-2L.

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☐ Catalog of new Guillotine Wire and Rod Cutters.

☐ Trade-in information on Guillotine model(s) .....

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a high quality, low cost
REVERSIBLE
SPEED REDUCER

Fits all portable drills . . . reduces speed, increases torque seven times. Ask your distributors to show you the . . .

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PROFESSIONAL MODEL
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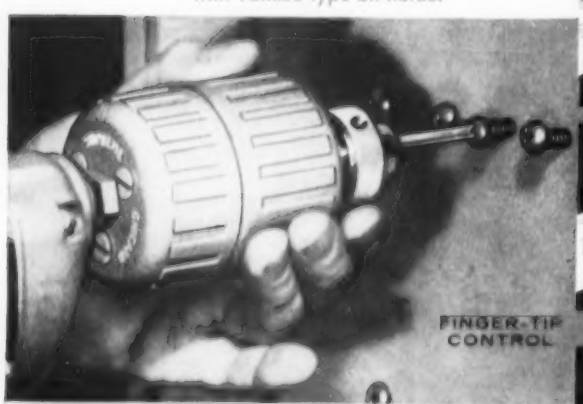
with Yankee-type bit holder



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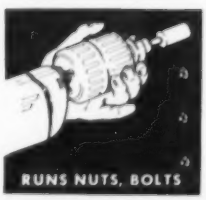
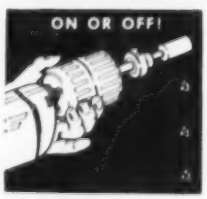
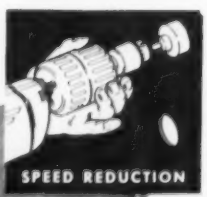






ROUND TABLE *Discussion*

WORKING THROUGH THE BREAK

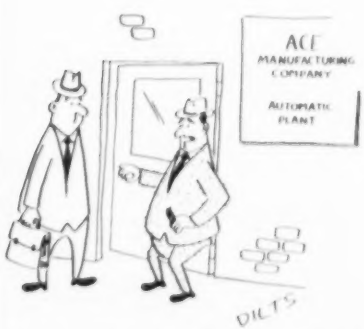
If a man doesn't feel like taking advantage of the coffee break, should he be asked to conform? Are the other workers justified in feeling that his apparent diligence makes them look like loafers?

In these days of frequent claims for higher wages and shorter working hours it is refreshing to know that there still are men so original, so daring, as to prefer working to having a spell off for a gossip and a cup of coffee at the company's expense.

In Scotland the favorite beverage is tea. Tea takes pride of place in the factory, with work a poor second. Men of the building trades have an unusual thirst and, if they come to repair a leak, they usually show up about nine in the morning, deposit their tools on the scullery floor, and produce their tea can. It is now tacitly accepted that work cannot possibly proceed until tea has been served.

Barrett may not be fond of coffee; he many not even be fond of work, and his refusal of the coffee break may be trick of vanity to make Al think he is. He does not seem to have closely observed his foreman or he would know that Al has no stomach for backing the odd man out, even if he privately agrees with his action in respect to the coffee break.

I have a feeling that Al secretly admires Barrett's attitude but is afraid of trouble with the rest of the men. He may be afraid of setting his section by the ears, and does not seem to have enough confidence in his ability to bring the coffee drinkers round to



"We're way behind schedule. I was sick last week and there was nobody to push the start button."

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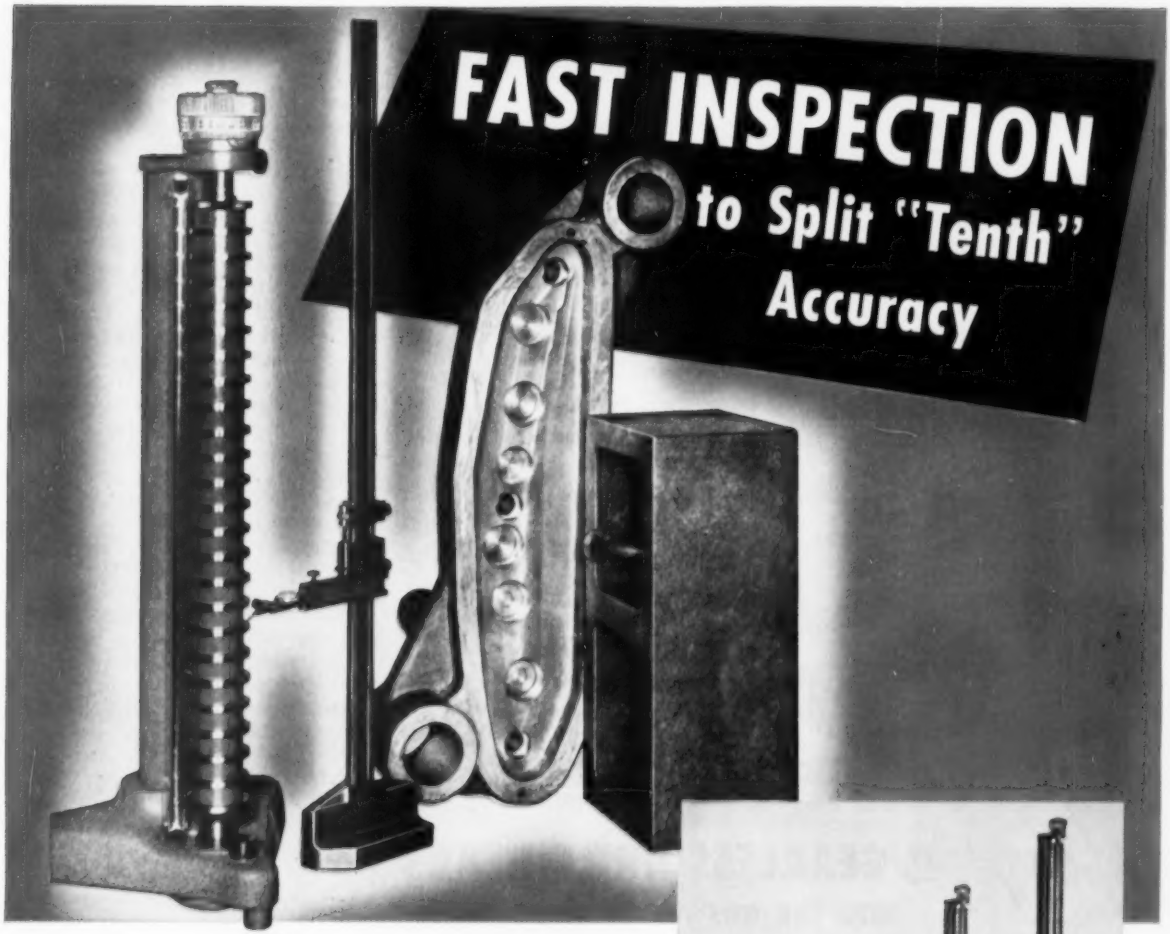

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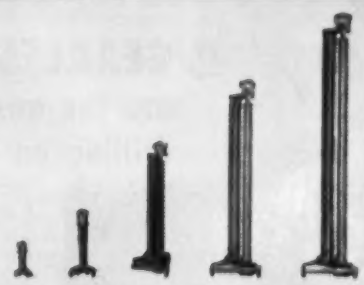

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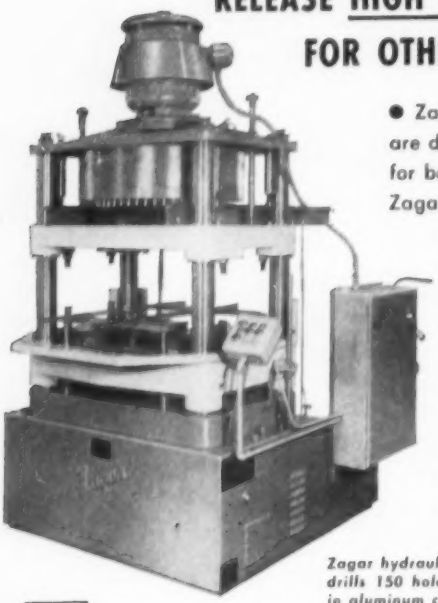
Zagar 4-POST RAM TYPE DRILLING MACHINES

RELEASE HIGH COST DRILL PRESSES FOR OTHER IMPORTANT JOBS



● Zagar hydraulic drilling machines are designed for high speed drilling—for both production and limited runs. Zagar 4-post machines reduce high cost tooling, and handle a range of work that ordinarily necessitates the use of *several different machines*. Very important, Zagar drilling machines release capital equipment for other purposes. Zagar 4-post machines lower your capital investment. They quickly pay out. What, sir, are your production requirements?

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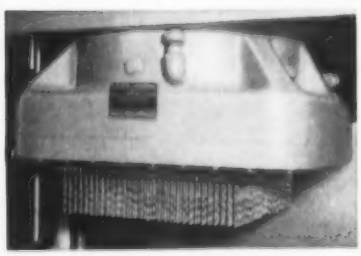
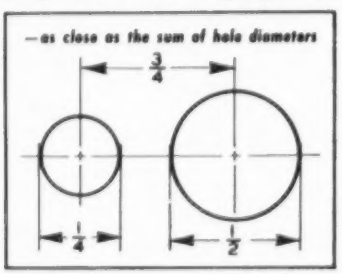


1000 spindles, drilling simultaneously, are possible with Zagar gearless drill heads. Any pattern drilling any machinable material is standard practice; any size up to 1½" dia. . . . Zagar can design the tooling for the entire drilling job; or, a Zagar gearless drill head can be used on your existing drill press. Zagar engineering is flexible enough to recommend and supply the answer that will cost the least and produce the most.



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ZAGAR, INC.

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Zagar TOOLS FOR INDUSTRY and SPECIAL MACHINERY

the view that, as Ed holds, Barrett has right on his side.

The ideal way out would be for Al to convince the men that Barrett has a right to refuse the coffee break and they have a right to take it. The men are not compelled to take the break—it's optional, so they're both within their rights. Without giving that method a fair trial Al would be in the wrong were he to "straighten out" Barrett. Foremen are expected and paid to be impartial, even if it is difficult at times; that is only one of the difficulties of foremanship.

I am all for democracy and individual liberty, but I feel that if complete agreement cannot be reached, the minority should agree to sink their differences and support the majority. In this case I don't think Al would be justified in holding a pistol to Barrett's head without exploring every avenue in search of complete agreement. It isn't good enough for Al to declare "It's easier for me to straighten out one man than the whole department." Of course it's easier, but is it better? Better for Al's reputation, better for the company, better for Al's peace of mind, and for the future peace of the shop? It's a solemn thought—to create an embittered man with right on his side. It looks like giving way to tyranny, it recalls Munich. One of the penalties of wrongdoing is its boomerang effect.

This is really not a serious matter to the protesting men to whom Al proposes to capitulate. They lose nothing in wages, and if Barrett does not feel in need of a breather, and does not earn money at their expense, it all seems to me a storm in a coffee cup. For Al to coerce Barrett would, in my opinion, lower his standing with the rest of the foremen and possibly with the top level executives, if it got to their ears.

There's an ever present possibility that once a body of men press and are granted an unjust claim they become more ambitious, and get dic-

"All I've been getting lately is 'Portia Faces Life'."

For fast, smooth cutting of aluminum flats, billets, rods, extrusions . . . or any other soft metals and materials . . . Simonds has the right saw or file for any particular job. Made of special job-rated Simonds steels . . . by top men working under ideal controlled conditions in Simonds famed windowless factory . . . every Simonds tool has the bonus-factor of finest performance and longest life. Yes, on any metal-cutting job, remember: "Say Simonds . . . *and save*".

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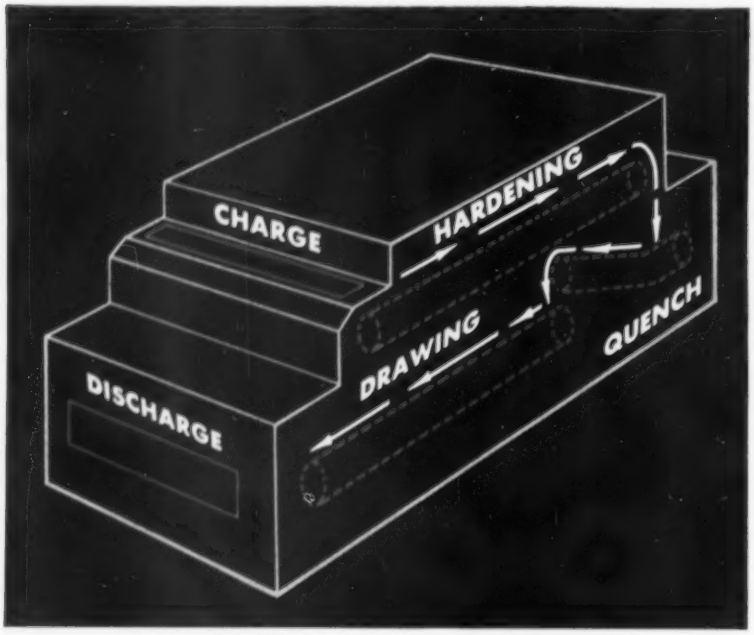

LET'S TALK ABOUT
DOUBLE DECK FURNACES

Ever try to fit two entirely different furnaces into floor space where only one will go? It can be done. All you do is *stack one on top of the other!*

Holcroft did it first a good many years ago. The furnace illustrated—by no means the first of its type—was built for a Detroit automobile plant back in 1932.

Three thousand pounds of connecting rods and spindles each hour were treated—moving first through a hardening furnace on the upper deck and then down a chute into a quench tank. Work was elevated by means of a reverse conveyor from the tank and loaded onto the return conveyor belt of the lower furnace for drawing and discharge.

Furnaces like these can be fully automated, or have manual transfers. They can be designed to heat treat a specific part, or to be used for general production.

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PRODUCTION HEAT TREAT FURNACES FOR EVERY PURPOSE

CHICAGO, ILL. • CLEVELAND, OHIO • DARIEN, CONN. • HOUSTON, TEXAS • LOS ANGELES, CALIF. • PHILADELPHIA, PA.
CANADA: Walker Metal Products, Ltd., Windsor, Ontario

tatorial to the minority and to the foreman who surrendered. Al may be piling up future trouble for himself and the company.

There must be many times when a man or men will be compelled by circumstances to work through the coffee break, and even through the meal hour. A lathe hand putting a scrape cut through a long bore would not risk stopping the tool in the hole to take a break for coffee. I believe it would be a mistake for Al to use compulsion against Barrett. If he cannot get agreement in the whole squad he should pass the problem to a higher level. A foreman isn't called on to assume unaided responsibility.

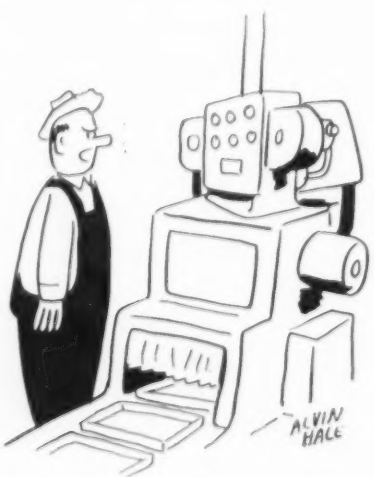
J C Ball
Bishopburn, Scotland

Perhaps we should say a very quiet "hooray for Barrett." Naturally we could not say it out loud because our social upgrading over the years has built up the desires in men for less work and more pay.

This policy is not being condemned, for if we can produce at the rate we are, and can continue to increase wages without completely causing a spiral which will engulf the entire structure, then let's do so. But also let us remember that when wages increase in manufacturing, and the cost of living increases, along with these two must be an increase of all of the service charges which industries must pay and the worker must also pay.

So we accomplish perhaps one thing only—more money coming into the household. Certainly not more savings, for the difference between wages and cost of living generally remains about constant.

Now with this background let's



"I know your tape doesn't say do that, so quit it."

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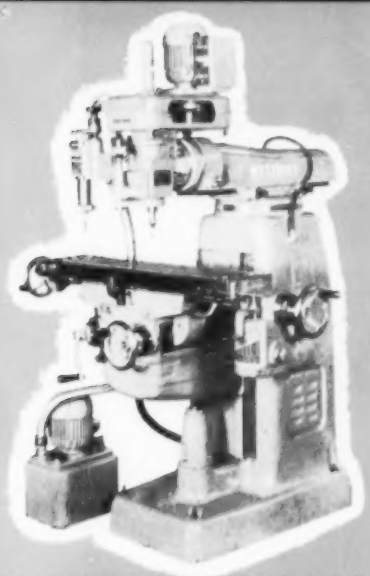

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- **Sensitivity to 0.00012**

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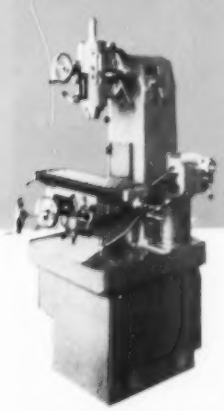

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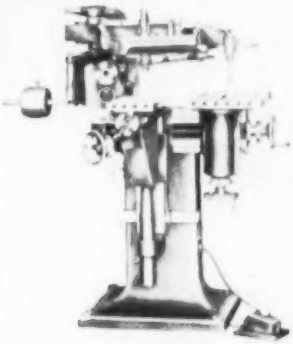

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3 Dimensional
Model PF/2
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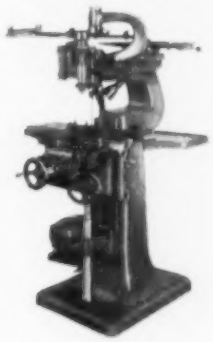

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2 Dimensional
Model CG/3
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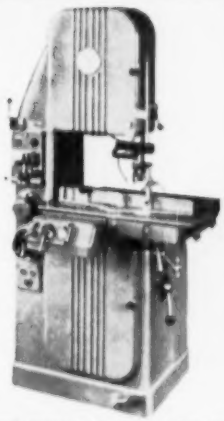

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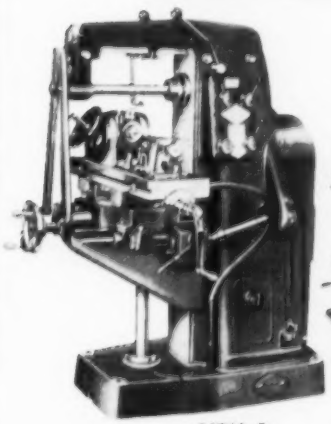
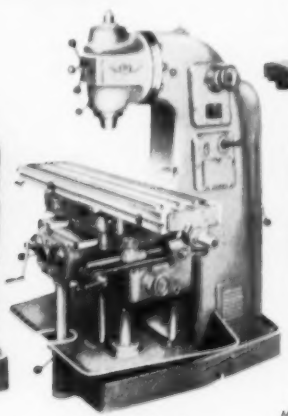


VPU-0
$2,595



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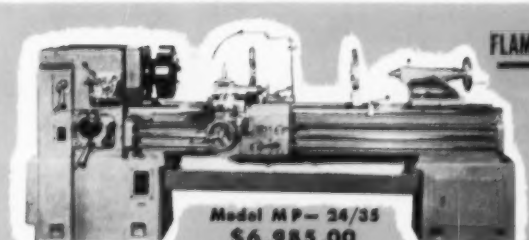
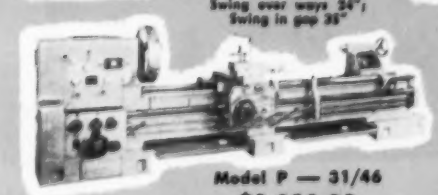


Model MP— 24/35
$6,985.00
Swing over ways 24";
Swing in gap 35"



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Swing over ways 31";
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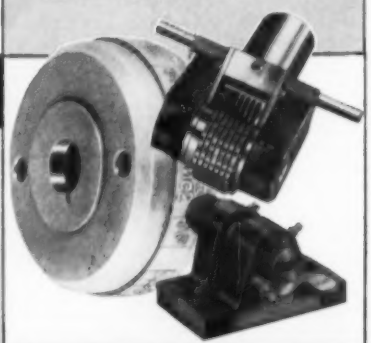

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by Parker

discuss coffee breaks. Yes, indeed, the policy now is to give two breaks per day. Generally this demand has been made by the workers and/or their unions.

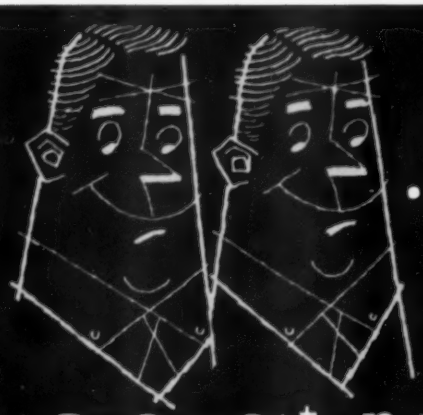
Whether it does good and increases production is a question still being battled around by the technically inclined engineers. To say it has become a successful dream of a way to keep people happy is an understatement. Naturally some people have no desire to sit around twenty minutes per day doing nothing. Their nature is such that they must keep busy. These people you will find even at lunch time doing something besides just sitting. A coffee break should be such that each person can do as he or she chooses, and not a condition forced upon everyone.

Naturally, if piece work is involved then sometimes forced work stoppage is necessary to keep harmony in a shop. But again we feel that if a person desires to make money rather than drink coffee it should be his own decision and not a forced rule. We do still live in a country where we may choose what we do—within limits. These limits, we'll agree, seem to be having less distance between them each year.

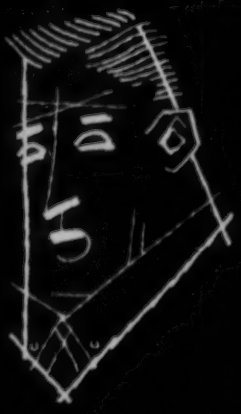
It is a difficult problem that Al faces, but an easy solution is to cut off the shop power for the ten minutes. This automatically prevents work and then no one can complain about someone working during coffee breaks.

When rules are made they are also broken. Perhaps a little study of shop conditions might prove why Barrett works, or, perhaps as we previously stated, he may be the temperament that must keep busy. Certainly Al should know the answer

"Did you send for me?"

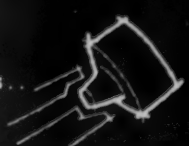


...two heads...

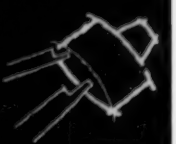


...are better than one...

...one head for this...



...the other head for this



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Above you see Fenway's new Heavy Duty Nibbler cutting through a piece of 10 ga. stainless steel. On milder steels or non-ferrous, it will handle 8 ga. with ease.

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*Softer metals in proportionately heavier gauges.

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by this time. He should never let it get to the stage where men are griping about one of their own group. This is definitely poor foremanship. The answer is, no doubt, to have the entire shop take the break with no exceptions. You have established a company policy, so live by it.

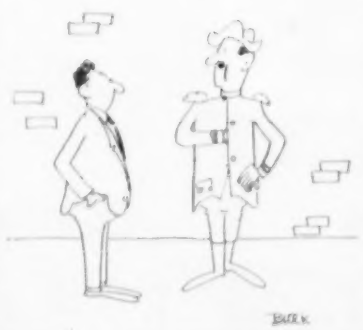
Charles D Townsend
West Hartford, Conn

I think Al would be smart to leave Barrett alone if he feels like working while the other boys are taking a break. Of course, if he makes a habit of it that would be something else again. For, sooner or later, some of the boys will let their irritation change to active dislike, and Al will have a morale problem on his hands.

If Brother Barrett tries to make a habit of working the break, Al should have a quiet word with him. Let him know that the company instituted the idea for *all* the employees, for their welfare, and with the idea that the time out would enable them to do a better job for the company. In other words, sell him the notion that the company wants 100% compliance with the break so that the benefits may be shared by all.

Just as it takes all kinds of people to make a world, we find all kinds in a machine shop. I have no doubt Al knows what makes Barrett tick, whether he is putting on an act for the purpose of drawing attention to himself, or if he is just one of those non-comforming or cussed individuals who refuses to go along with the common herd. Whatever it is, Al, I would lose no sleep about it. Just see that Barrett doesn't do it often enough to get the rest of the boys riled up.

Robert S Alexander
Glastonbury, Conn



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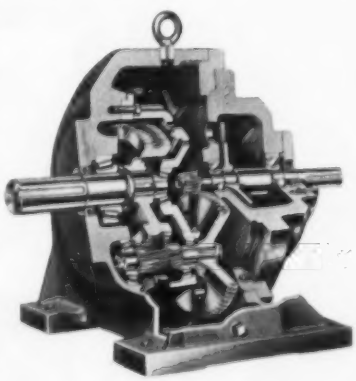

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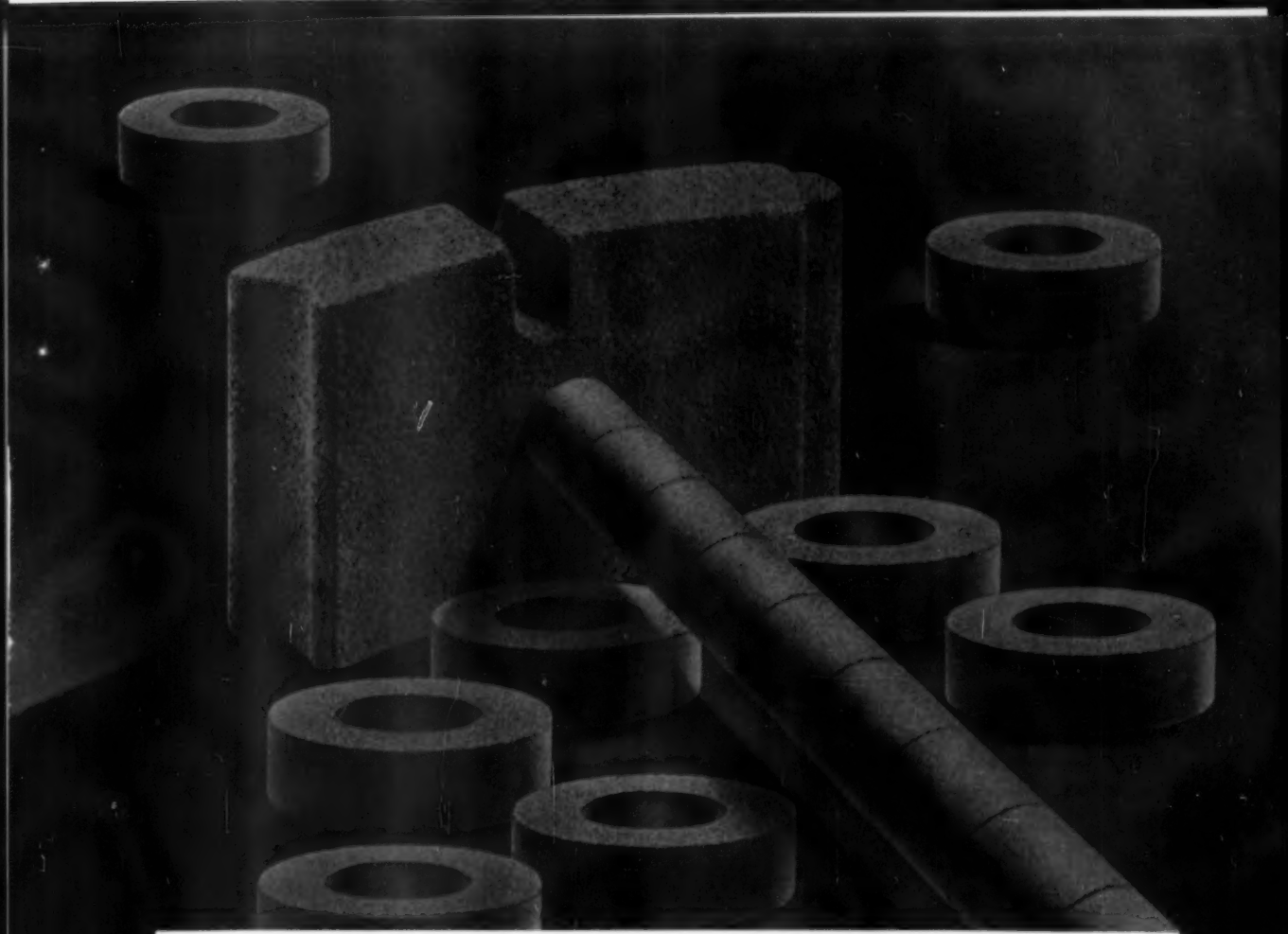

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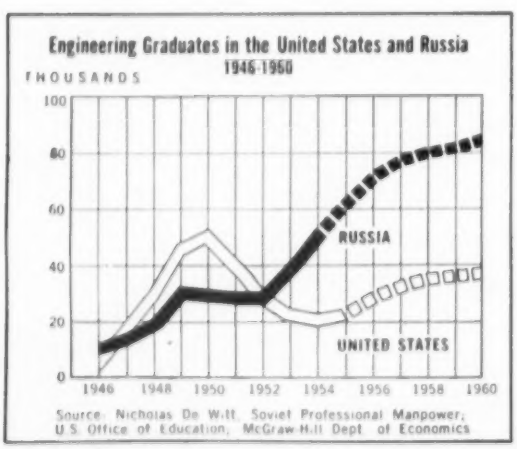
THE SHORTAGE OF SCIENTISTS AND ENGINEERS:

Are We Losing the Race with Russia?

THERE is new confidence in the Kremlin. One key reason is expressed in a recent boast of Communist Party Secretary Khrushchev: **"The capitalists always regard our people as being backward, but today we have more engineers and more supporting engineering technical personnel than any capitalist country."** He promised that this lead would be widened and that communism would be victorious without war.

This boast cannot be dismissed as communist propaganda. Admiral Lewis L. Strauss, chairman of the U. S. Atomic Energy Commission, has warned: **"In five years our lead in the training of scientists and engineers may be wiped out, and in ten years we could be hopelessly outstripped. Unless immediate steps are taken to correct it, a situation, already dangerous, within less than a decade could become disastrous."**



This second editorial in a series on the shortage of scientists and engineers is designed to explore as carefully as possible the facts and the implications of the new emphasis on technical training in the Soviet Union. It draws heavily from the authoritative book *Soviet Professional Manpower,* prepared for the National Academy of Sciences and the National Research Council by Nicholas DeWitt of the Russian Research Center of Harvard and released recently by the National Science Foundation.

Trend Is Against Us

If the Soviet Union already has a lead in technical manpower, it is not very great. Both the United States and Russia now have around a million scientists and engineers. About a third of the Russian engineers were trained on inferior pre-1935 standards. **It's the trend — shown in the chart — that is alarming.**

Over the last five years we have turned out only 142,000 engineers, compared to an estimated 216,000 in Russia. In 1955 our output was around 23,000 compared to their 63,000. Over the next five years our projected output is 153,000, against at least 400,000 in Russia. There will be an additional 150,000 or more in the satellites and Red China.

In Russia, 30% of the college students are in engineering, compared to 8% here. Another 30% or more take degrees in natural sciences. Moreover, unlike ourselves, the Russians are

ploughing back a large proportion of their science graduates into teaching, which implies a rapid buildup in the future.

Quality As Well As Quantity

It would be foolhardy to assume that these new Russian graduates are inferior to ours in the quality of their technical training. They start out with much more intensive mathematical and scientific preparation at the high school level. They study harder and longer in college, with more laboratory work and more practical training. Their courses and textbooks seem to be as thorough as ours. Even though the Russian graduates may be overspecialized, they get results.

These results have been striking. The Russians developed both A-bombs and H-bombs faster than we expected, and it's not certain that they had to rely much on espionage. They pushed ahead of us for a while in jet fighter design, and they showed up with a fleet of long-range bombers well ahead of schedule. They are crowding us on nuclear power, electronics and automation. There are grave fears that they have established a lead in the vital field of military rockets.

The goal of Soviet scientific manpower policy includes not only weapon supremacy but also leadership of the neutral and uncommitted areas of Asia, Africa and the Middle East. The Soviet leaders may be bluffing in their offers to export capital, but they are preparing to export Russian scientific and technical know-how in a big way.

How They Do It

The Russians are determined to win the race for scientific supremacy, and they do not count the cost. **They pay their scientists and engineers salaries that seem fantastic when compared with other Soviet incomes.**

Senior professors, research scientists and top engineers are a major segment of the Russian elite. Their incomes are frequently six to ten times the average industrial wage. (In the U. S. six to ten times the average industrial wage would be $25,000 to $40,000 a year.) Housing and other privileges are correspondingly lavish. While preaching equality, the Soviets use capitalistic incentives far more boldly than we do. Indeed, practicing engineers and scientists have been complaining about the exalted status of professors and top research people, and salary scales are now being adjusted to give greater emphasis to practical results.

The Russians are also generous in their aids to education. Tuition has just been made free at all levels. Undergraduates receive 200 to 500 rubles a month and graduate students 800 rubles (about equal to an industrial wage) to cover living expenses. The biggest stipends go to science and engineering students. College students are deferred from military service, and engineers and scientists often enjoy continued deferment even after graduation.

Finally, the Soviet leaders can channel engineers and scientists — and all other human and material resources — into any area they choose. And the areas the Soviet leaders choose are predominantly those that contribute to military or political objectives, rather than to a better life for consumers.

What's Our Answer?

We are certainly not going to adopt Soviet methods. We do not want scientific robots, but free men, able to understand and add to our democratic heritage. At the same time, our world leadership in technology — and perhaps even our survival as a nation — will be threatened if we allow ourselves to lag far behind Russia in the training of scientists and engineers. Ways to keep the United States in the race will be discussed in a later editorial in this series.

This is one of a series of editorials prepared by the McGraw-Hill Department of Economics to help increase public knowledge and understanding of important nationwide developments of particular concern to the business and professional community served by our industrial and technical publications.

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New Books

ALUMINUM PAINT AND POWDER, THIRD EDITION—*By Junius David Edwards, technical associate, and Robert I Wray, chief, Paints and Finishes Div, Aluminum Research Laboratories, Aluminum Co of America. Published by Reinhold Publishing Corp, 430 Park Ave, New York 22, NY. 219 pages. Price $4.50*

Of interest to users of aluminum powder, this book describes the manufacturing, properties, and testing of aluminum powder and paste. Most of the book is devoted to aluminum paint, covering its composition and application to metal, wood, and for various special purposes. There is also a chapter on aluminum in printing and on other applications of powder.

•

CATALOG OF GOVERNMENT TECHNICAL REPORTS ON CERMETS, TRANSISTORS, AND MAGNETIC AMPLIFIERS—*Published by Office of Technical Services, US Dept of Commerce, Washington 25, DC. Price 10¢ per copy.*

All applicable research reports in the OTS collection of over 250,000 documents are abstracted in these catalogs. Technical reports are primarily the results of research by the government or by private laboratories under government sponsorship, but also include German technical papers captured in WW II. The reports are available from OTS or the Library of Congress. Order catalogs by number CTR-319 Cermets, CTR-310 The Transistor (revised), CTR-244 Magnetic Amplifiers (revised).

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STANDARDS AND DIMENSIONS FOR TAPS AND DIES—*Published by the Metal Cutting Tool Institute, 405 Lexington Ave, New York 17, NY. Price $1.25.*

Proper design of screw-thread assemblies involves at least two major steps: (1) selecting a standard thread so standard tools can be used, and (2) choosing a tap drill that gives an adequate percentage of thread but does not overload the tool. To assist shop personnel and designers, the Institute has pub-

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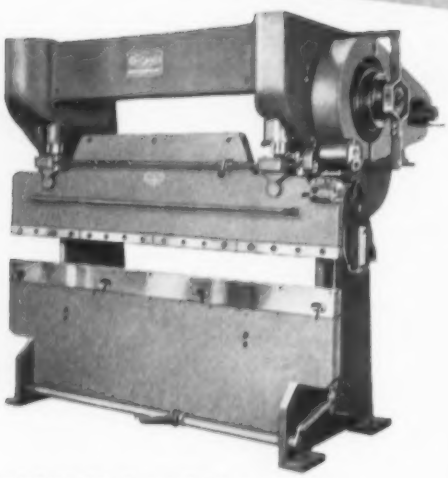

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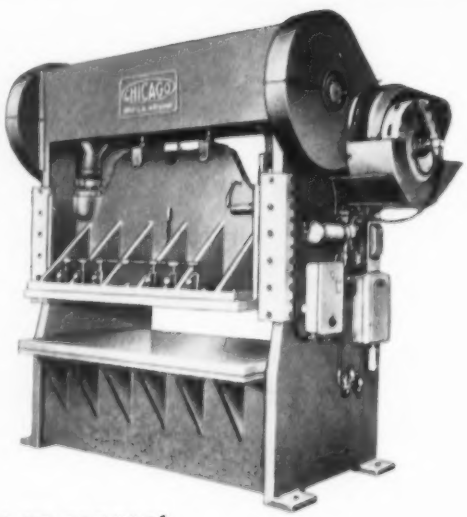

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The Institute's standards for taps

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Proportions of the Unified and American threads.

The pamphlet is a valuable and convenient compilation of the most essential information in respect to taps and tapping, especially the subject of tap-drill selection. An excellent discussion shows why too great a percentage of engagement adversely affects tap life.

•

INTRODUCTION TO PLASTICITY—*By Aris Phillips, Associate Professor of Civil Engineering, Yale University. Published by The Ronald Press Co, 15 E 26th St, New York 10, NY. 229 pages. Price $7.*

An introduction to metal plasticity from the point of view of the stress analyst, this book starts with simple axial loading and works up to combined stresses.

Mathematical tools have been kept to a minimum and should require little beyond that knowledge needed for a basic strength of materials course. Where proofs of theorems are not essential to an understanding of the subject they have been omitted from the text and included in an appendix.

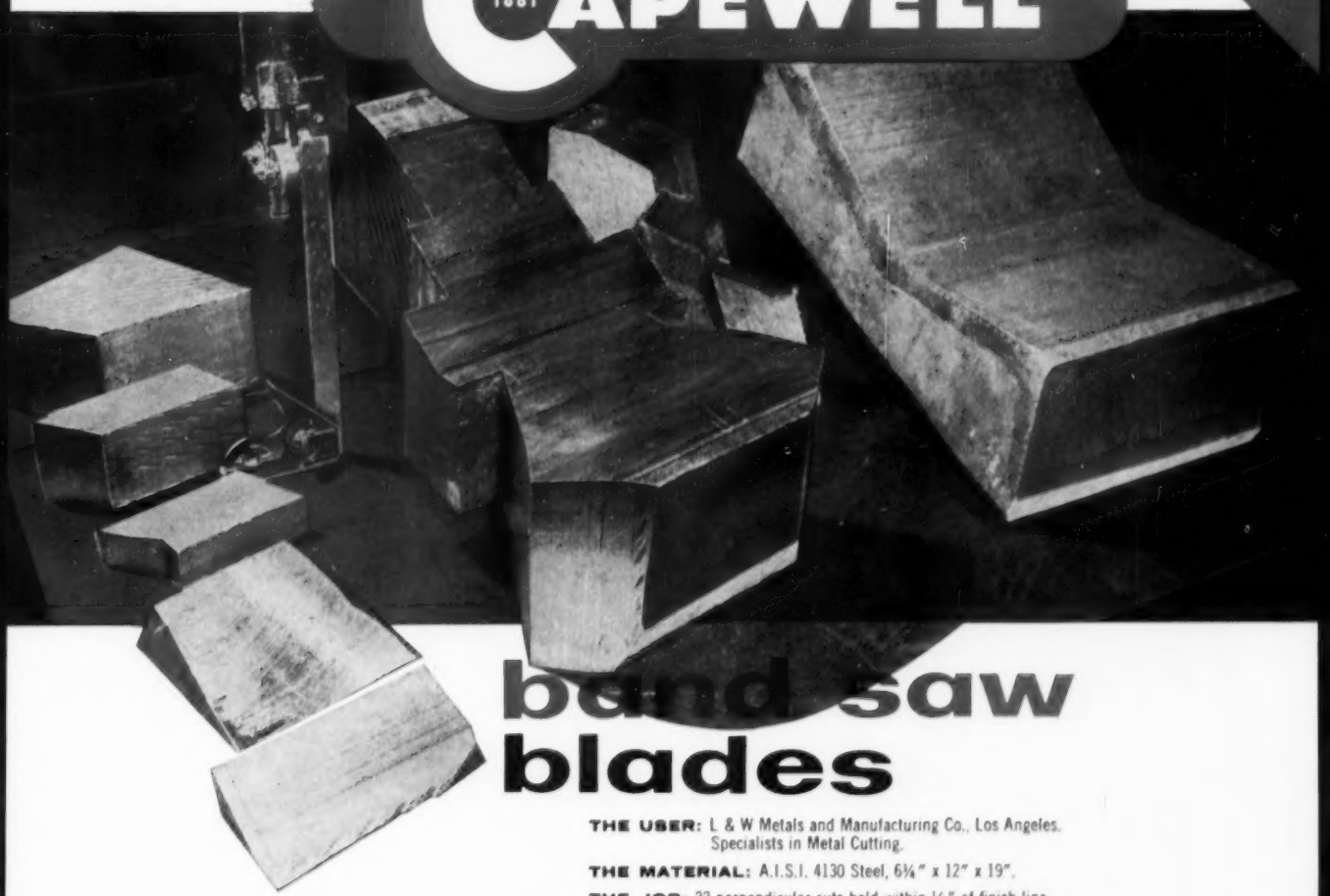
After an introductory discussion of stress-strain diagrams, the book covers the calculation of the collapse load, the moment-curvature diagram, bending with axial force, deflections, curved bars, stress-strain relations, collapse under combined stresses, and strain hardening under combined stresses.

•

TASCHENBUCH FUR BETRIEBSINGENIEURE (REFERENCE BOOK FOR MANUFACTURING ENGINEERS) 4TH EDITION — *Edited by Akademischer Verein Huette and Dr Ing Hans Roegnitz. Published by Wilhelm Ernst & Sohn, Berlin-Wilmersdorf, Germany. Vol I, 939 pages. Price DM 69.50 Vol II, 727 pages. Price DM 54.00.*

Because of the increased content, it has now become necessary to publish this new edition in two separate

cut it with 1881 CAPEWELL stop



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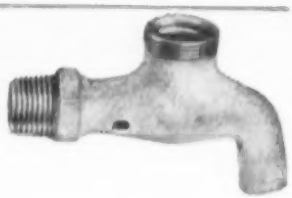

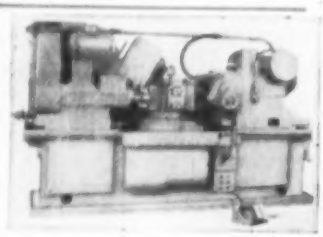

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volumes to avoid its becoming too bulky and to make for easier handling. Considerable new material has been added, and many changes and improvements have been made.

Vol I — Production — consists primarily of the material contained in the original Section 2 previously reviewed (*AM*—April 13 '53, p294) and consists of nine chapters: study of materials, noncutting shaping, metal cutting, machining nonmetals, production, elements and equipment of machine tools, machine tools and tools for noncutting shaping, machine tools for cutting, and machine tools for machining nonmetals.

Vol II—The Factory—consists of Chapters 10 to 14 and covers manufacturing plants, plant utilities, manufacturing plant and its organization, fundamental knowledge, and, in Chapter 14, a large number of useful tables. Chapter 10 is divided into seven parts dealing with: planning and layout of factories; plant construction, including fundamentals of constructional elements and pertinent tables; shop arrangement and equipment; transportation; storage; industrial ovens; and plant safety and fire protection.

Chapter 11 is completely new and is concerned with plant utilities. It also has seven parts. Part 1 covers heating, ventilation, dust control, water heating, refrigeration, compressed air and gas, water supply, sewage disposal, lighting, communications, and kitchen facilities. Part 2 deals with power supply; Part 3, fuels; Part 4, design and servicing of boilers. Part 5 (machinery) goes into the subjects of steam turbines, reciprocating steam engines, internal combustion engines, water power, pumps, and testing and measuring equipment. Part 6 deals with electrical equipment and Part 7 with servicing of machines.

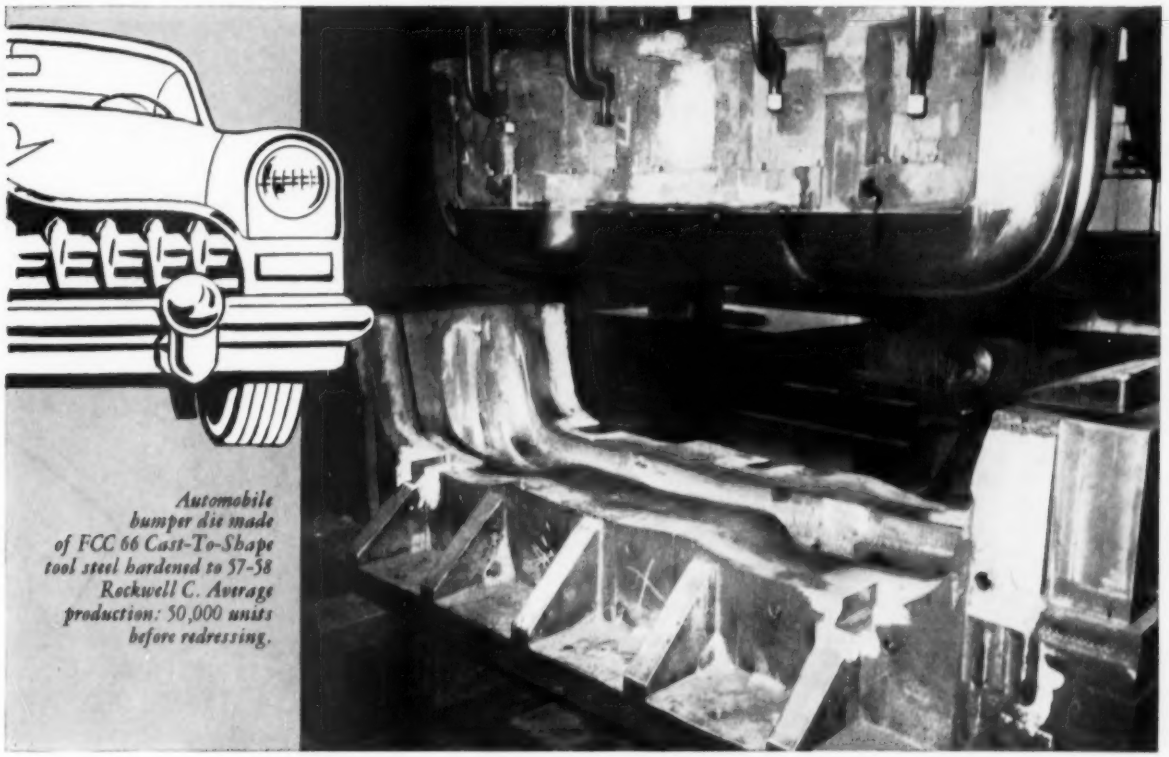
Chapter 12 goes to quite some detail on "Organization of a manufacturing plant," while the new Chapter 13 reviews basic information on chemistry, mathematics, heat, strength of materials, electricity, and measuring methods.

Both volumes include a complete index, each covering Vol I and II.

Complete familiarity with the German language is, of course, necessary for the book to be of value, but those who possess this knowledge will find it a valuable adjunct to their reference libraries. Vol I is intended primarily for the production engineer, while Vol II considers the needs of engineers in power plants and in factories having their own electrical and power installations.

Reviewed by Dr Henry W Roehrig

Try this money-saving method that auto-makers use



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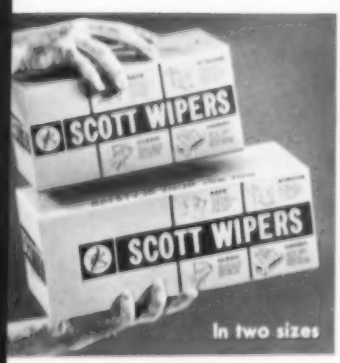
AL
FINE TOOL STEELS SINCE 1854

To get clean wipers at the tool crib, this lathe operator must make the hike, then stand in line. Dirty wipers in hand, he makes the trip at least once a day, takes several minutes to do it.

He has to waste 60 minutes a week



Easy to distribute

Really soak up oil . . .

Always a clean one handy . . .

Just toss 'em in the trash . . .

With a carton of 125 clean Scott Wipers at every workbench, daily wiper replacement is often unnecessary. One carton can last for days and a man has a fresh supply right at his fingertips.

. . . He stays on the job

The difference is . . . Scott Wipers

Check your production line. See how much time the men are forced to waste in order to keep supplied with fresh wiping material.

It adds up to more lost production time than you might think.

Scott Wipers are disposable. A man picks up a carton when he checks in . . . keeps it with him all day long. He uses one Wiper thoroughly—throws it away. Complicated distribution is ended. So is sorting, baling, and laundering.

And with fresh Scott Wipers there's no danger of hidden chips damaging men or metal.

Your local Scott representative or distributor will demonstrate the Scott Wiper in your plant. Call him or mail this coupon today.

Another quality product of . . .

SCOTT PAPER COMPANY

Scott Paper Company
Dept. W-3, Chester, Pa.

Please send me more information about Scott Wipers.

Name _____

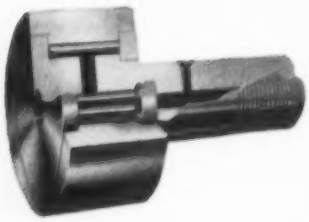
Company _____

Position _____

Address _____

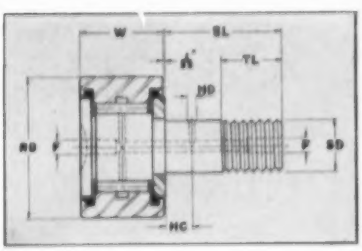
BEARING TIPS by McGill

BEARING BUILT FOR HEAVY-DUTY CAM LOADS



Camrol CF Bearings provide the ultimate in radial capacity, shock resistance and space economy for all cam actioned or guide and support roller applications. An extra heavy outer ring operates on a full complement of small diameter rollers supported by an integral inner race, roller retaining flange and stud. Designed as precision replacement for plain bearing or improvised bolt and bearing units.

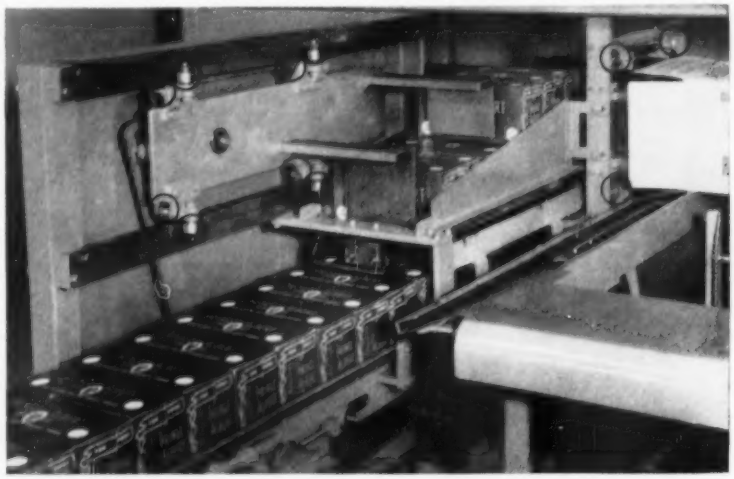
New Sealed Bearing Adds to Versatility of Standard Cam Follower



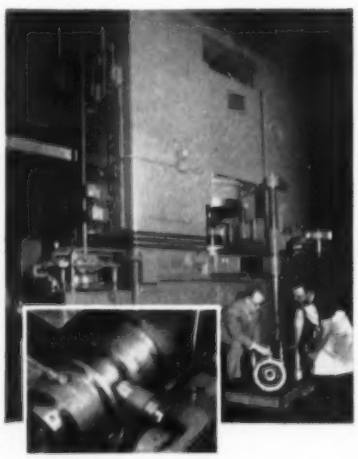
The new SCF series bearing keeps contamination out and lubrication in by means of specially-treated synthetic seals. The SCF bearing is interchangeable dimensionally with standard Camrol bearings.

140 Pages of Bearing Facts

Write for your copy of Catalog No. 52, a revised 140-page Bearing Selection Guide. It contains vital product information and 50 pages of engineering data.



CAMROL CF Bearings Cut Power Requirements on J. L. Ferguson Co. Packaging Machines



New Shear-Speed Shapers Achieve Greater Speed and Accuracy Using CAMROL CF Bearings

Michigan Tool Co. uses Camrol CF and CYR bearings in their new machines that produce gears up to 20 inches in diameter and up to 6-inch face widths in only 15 minutes. These bearings, acting as cam followers, accurately control cutting tool feed and relieve tools from the work on return strokes. They insure dependable, precision performance for automatic operation at high production speeds.

Up to 50 Camrol Bearings Used Per Machine

Used as load-carrying cam followers and as guide rollers in PACKOMATIC packaging machinery, McGill Camrol CF bearings have brought several desirable advantages to J. L. Ferguson Company in the eight years this firm has relied on Camrol Bearings.

Exceeding the performance of the roller and pin assembly formerly assembled in the Ferguson plant, the Camrol cam follower bearing has helped improve a variety of cam actuated operations on many of the versatile packaging machines built by Ferguson.

The Camrol CF bearings eliminate wear by reducing friction. This also reduces power requirements for the machines. The CF bearings cost less and are more easily applied than the previous assembly.

For trouble-free operation, up to 50 bearings per machine are now used by this company.

Insure performance with McGILL®

MULTIROL® GUIDEROL® CAMROL
Full Type Roller Bearings

McGILL MANUFACTURING COMPANY, INC., 300 N. LAFAYETTE ST., VALPARAISO, INDIANA

Names in the News . . .

W H Carrigan has been appointed vice president and general manager of Kirkhof Manufacturing Corp, Grand Rapids, Mich. **J J Krestakos** has been named sales manager

Albert J Fischer, director of research and development for Adamas Carbide Corp, Kenilworth, N J, has been named works manager

Edwin M Butler, chief inspector for Heinz Manufacturing Co, Philadelphia metal stamper and fabricator, has been named to the new post of assistant to the executive vice president. **John H Thacher,** manager of quality control, has been appointed head of the new Quality Department.

Robert R Miller, vice president, administration, of Northrop Aircraft, Hawthorne, Calif, has been promoted to the newly created post of vice president and general manager. **C Hart Miller,** assistant to the president, takes over Mr R R Miller's duties. **Richard R Nolan,** manager of the Anaheim Division, has been appointed vice president, manufacturing, to succeed **Kenneth P Bowen,**

CARB-O-PLATING

brings you CARBIDE WEAR LIFE at Substantially Lower Cost

By the application of a thin wear-resistant coating of tungsten carbide—by means of the Linde Process—the life of gages, parts and tools is extended many times over.

Carb-O-Plating as employed by Lincoln Park offers you definite advantages. It provides the wear life of carbide at a cost considerably lower than when solid material is used. And because it is applied over a steel base, the products have resistance to mechanical shock and are not subject to breakage as can occur with sintered carbide. The process also makes possible the highest degree of accuracy in finished products.

In addition to these features, Lincoln Park offers the extra advantage of extremely fine finishes—characteristic of all the company's precision products. Full information on Carb-O-Plating is yours for the asking. Write today.

THE PLUS IN PRECISION

Lincoln Park INDUSTRIES, INC.

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GET THE PLUS IN PRECISION IN All LINCOLN PARK PRODUCTS

PLUG AND RING GAGES—Carbide, Carbide Plated, Chrome Plated, Steel • DIAL SNAP GAGES • THREAD GAGES—Carbide, Steel • SETTING DISCS • SETTING PLUG GAGES • CARBIDE SERRATED ANVILS • CARBURS—Carbide Rotary Files • SPECIAL GAGES • SPECIAL NON-CUTTING PRECISION TOOLS • PRECISION PRODUCTION PARTS.

Complete literature supplied upon request.

LINCOLN PARK INDUSTRIES, INC.

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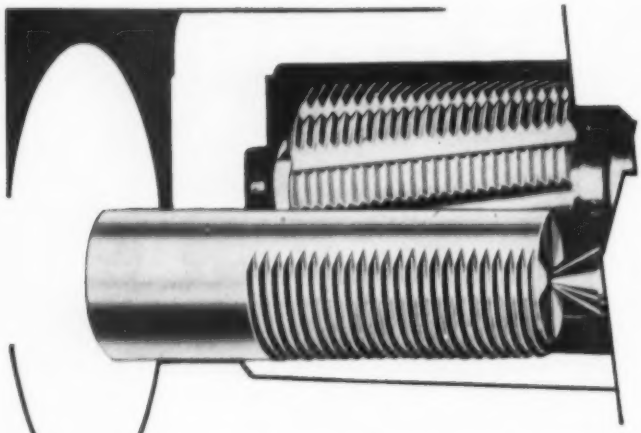
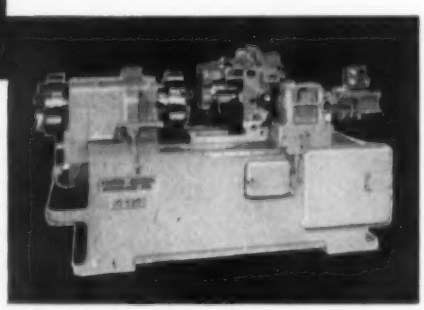


THREADS WITH ONE TURN!

Hanson-Whitney Thread Milling Machines* produce threads with approximately one revolution of the work. Unusual versatility . . . cutting internal, external, straight or taper, left or right hand threads. An exclusive cam design eliminates back lash . . . provides complete automatic cycle for lead, depth, rapid retraction for gaging or loading. Hanson-Whitney **single source** engineering and manufacture of machine tool, cutting tools, fixtures and gages for screw threads, assures production precision. Consult Hanson-Whitney engineering service, always available in the field or at home offices.

*Available — larger sizes and/or special cycles; automatic loading — rough and finish cycle; extra length beds, oversize swings.



Standard models available in
4" x 9" (hydraulic)
8" x 16"
10" x 24"
15" x 30"

Write for further information and literature

Hanson-Whitney
COMPANY
DIVISION OF THE WHITNEY CHAIN COMPANY
170 BARTHOLOMEW AVENUE • HARTFORD 2, CONN.
TAPS • THREAD GAGES • HOBS • CENTERING MACHINES • THREAD MILLING MACHINES AND CUTTERS

who has resigned. **Thomas H Quayle,** assistant manager of the Division, has been named manager. **George Douglas,** assistant chief engineer for the company, takes over Mr Quayle's post. **Jack Mannion,** assistant director of quality control, has been appointed assistant to the vice president and general manager.

H D Murray has been appointed eastern division sales manager of Peninsular Grinding Wheel Division, Detroit. He will make his headquarters in Cleveland. **F R Old** has been named sales manager, western region, with offices in Detroit.

Fred F Herman, manager of ordnance engineering at Westinghouse Electric Co's plant at Sunnyvale, Calif, has been named to head the switchgear distribution apparatus facility to be built near Bloomington, Ind.

Glen J Hartman, assistant manager of operations of the Ohio Seamless Tube Division of Copperweld Steel Co, Shelby, Ohio, moves up to the post of manager. He succeeds **Raymond E Dewey** who has resigned.

Dale L Bennett has been promoted from assistant to superintendent of the Tool & Machine Manufacturing Division, Acme Steel Co, Chicago.

William L Naumann, manager of Caterpillar Tractor Co's Joliet, Ill, plant, has been appointed manager of the Peoria, Ill, facility. He succeeds **Lloyd J Ely. Clifford N Hathway** takes over Mr Naumann's post at Joliet.

John R O'Brien has been appointed director of the production planning and scheduling department of Chrysler Corp's central manufacturing staff. He had been assistant general production manager with the staff.

Franklin S Atwater, assistant works manager of Fafnir Bearing Co, New Britain, Conn, has been appointed general works manager. **Thomas J Leonard** has been named general production manager.

James O McDonough has been elected president of Concord Control, Inc, Cambridge, Mass. The newly formed company specializes in the development and manufacture of numerical control equipment for machine tools and industrial processes. **Herbert P Grossimon** is vice

Chances are at least **98 out of 100** that this part will be **perfect**

The Metal Stampings Plant, Sylvania Electric Products, Inc., keeps rejects under 2%—even on complex, close-tolerance parts produced at rates to 9,000 per hour. Optical gaging helps set this level.

The diode plate shown above is an example of the complex, mass-produced, parts turned out to close tolerances by The Metal Stampings Plant, Sylvania Electric Products, Inc., at York, Pennsylvania. Tolerances run to ± .001″; as many as 10 dimensions must be held, including inner and outer diameters. Yet even on parts more difficult than this—parts with tolerances of .0005″ and forming rates of 9,000 per hour—Sylvania gets an acceptance rate of over 98%.

Inspection on Kodak Contour Projectors helps Sylvania do the job to the satisfaction of its customers, both internal and external. Operators check the first parts produced by every machine to assure correct setup. Then, throughout the run, production samples are checked at regular intervals—making certain each machine is holding to tolerance. The speed with which these parts can be checked using optical gaging methods has helped slash rejection rates more than 50% since Kodak Contour Projectors were installed.

If you have difficult inspection problems involving quantity, speed, close tolerances or hard-to-measure dimensions like shoulders, holes, radii or angles, there's every reason to expect a solution by optical gaging on a Kodak Contour Projector. There's a representative in your area who can tell you more. To get in touch with him, or for a copy of the booklet, "Projection Gaging with Kodak Contour Projectors," write Special Products Sales Division.

Little training is required to operate a Kodak Contour Projector. Operators sit comfortably in a fully lighted room. The work gets out in a hurry.

EASTMAN KODAK COMPANY, Rochester 4, N. Y.

the KODAK CONTOUR PROJECTOR

Kodak
TRADE-MARK

It figures
✓ FASTER MACHINING
✓ LONGER TOOL LIFE
✓ FINER FINISH
✓ QUALITY CONTROLLED
MORE PRODUCTION!
MORE PROFIT PER UNIT!
COLD FINISHED STEEL
Controlled
CARBON
and
ALLOY
WYCKOFF
COLD FINISHED STEEL
Carbon, Alloy and Leaded Steels • Turned and Polished Shafting • Turned and Ground Shafting • Wide Flats up to 14"
All types of furnace treated Steels
SPECIALISTS IN COLD FINISHED STEELS EXCLUSIVELY
WYCKOFF STEEL COMPANY
GENERAL OFFICES:
Gateway Center, Pittsburgh 30, Pa.
Branch Offices in Principal Cities
Works: Ambridge, Pa.—Chicago, Ill., Newark, N.J.—Putnam, Conn.

president in charge of engineering, and **Richard W Lawrie** vice president, sales.

William F Harper has been named plant manager at Pacific Fittings Division, General Metals Corp, Hollydale, Calif. He has been serving as assistant to the president in the San Francisco office. **Leo Wansink** has been appointed plant manager at Vernon, Calif, and **Howard C Harris** director of manufacturing.

Chester C Lonsdale has been named assistant to the superintendent of the Pressed Steel Division at Standard Pressed Steel Co, Jenkinstown, Penna. He has been serving as general foreman of the division.

Fred W Lucht, formerly associated with the Carboloy Co, has rejoined Goddard & Goddard Co, Detroit. He will head a new cutting tool application research laboratory to be created under his supervision.

Russell Dupuis, formerly associated with Universal Cooler Corp, Detroit, has rejoined Vickers Inc as plant manager of the Omaha Production Division.

V A Kirby, vice president and manager of the Winnipeg plant of John Wood Co, Ltd, has been appointed vice president and manager, western plants. The company is the Canadian subsidiary of International Metal Industries, Ltd. **T H Gibson,** vice president and assistant manager at Winnipeg, succeeds Mr Kirby.

George Sines, formerly assistant vice president of Lakeshore Engineering Co, has joined Easton Car & Construction Co, Easton, Penna, as chief engineer.

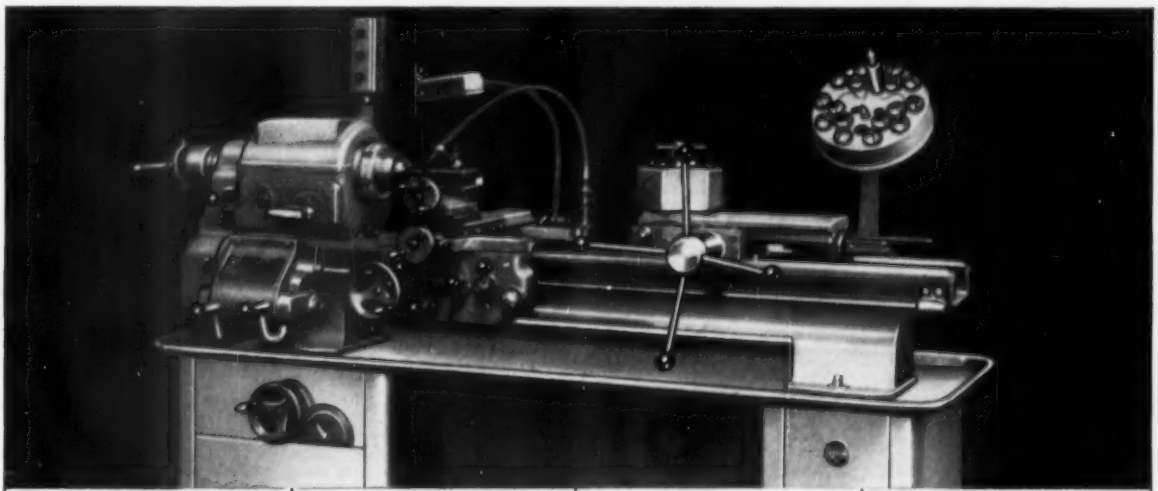
Allen Wilson, manager of Burgess-Manning Co's Architectural Products Division in Chicago, has been elected a vice president of the company.

Michael J Kniola, formerly associated with the Carboloy Department of General Electric, has joined Adamas Carbide Corp as production manager.

John V Gregory has been promoted to manager of the New Jersey office of Barksdale Valves.

Norman R Prusa has been appointed field representative for the National Screw Machine Products Association, Cleveland.

now—convert your ROCKWELL-BUILT DELTA 11" metal lathe into an efficient production machine!



Bed Turret

Turret Tool Post

Collet Closer

Coolant Group

NEW DELTA PRODUCTION ACCESSORIES *give you double versatility at low cost with the Delta 11" Metal Cutting Lathe—a ram-type turret lathe for precision manufacturing; an engine lathe for toolroom, maintenance and experimental work.*

PRECISION BED TURRET has self-indexing, six-station forged steel head. Converts 4 or 5-foot bed engine lathe into ram-type turret lathe for production work requiring multiple machining operations. Also simplifies many single operations normally done on an engine lathe.

TURRET TOOL POST FOR COMPOUND to do facing, turning, thread cutting, drilling, boring and many other operations. Heavy steel construction with hardened, rust-resistant parts.

DELUXE LEVER TYPE COLLET CLOSER provides accurate, powerful gripping action without marring stock. Used with all 5-C collets. Bars can be fed, chucked, machined and released without stopping the spindle for fast, uninterrupted production.

DELTA COOLANT GROUP increases efficiency of lathe operations; can be used with both 4 foot and 5 foot Delta Metal Lathes. Your Delta Dealer also has Delta Coolant Pumps and Tanks.

See the entire DELTA 11" Metal Lathe line—and new DELTA production accessories. Compare—for quality, performance, and price. Then make up your own mind! Your DELTA Dealer is listed under "TOOLS" in the Yellow Pages.

Send Coupon For All The Facts!

DELTA another product by ROCKWELL

Delta Power Tool Division,
Rockwell Manufacturing Company
618F N. Lexington Avenue, Pittsburgh 8, Pa.

- ☐ Please send me catalog information on new DELTA Production Lathe Accessories.
- ☐ Please send me catalog on DELTA 4' and 5' Metal Cutting Lathe line.
- ☐ Please send name of nearest DELTA Dealer.

Name _____ Title _____

Company _____

Address _____

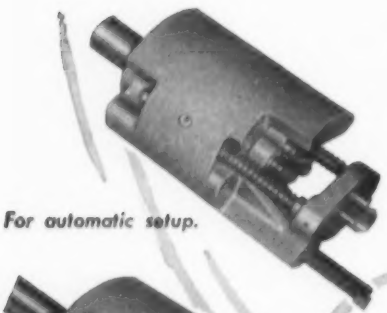
City _____ County _____ State _____

Heads...You Win!

U. S. DRILL HEADS, THAT IS!

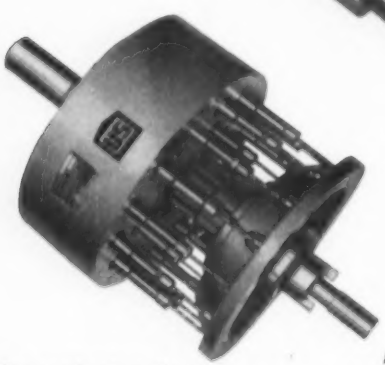
Regardless of the size of your shop, if you have high production jobs, you'll find an extraordinary reduction in tooling and manufacturing costs when you use U. S. Drill Heads.

The heads shown here, moderate in cost, are for use with automatic chucking machines and turret lathes, for drilling or tapping operations. They provide, in most cases, that a part can be completely finished in one handling.

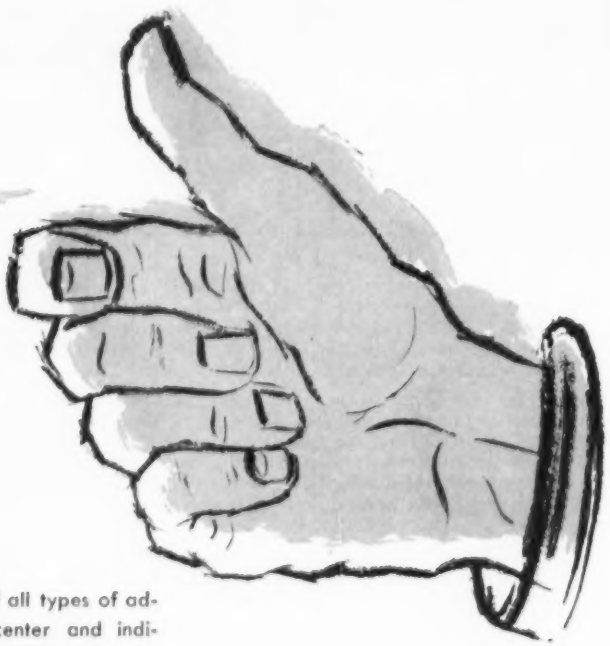


For automatic setup.

For semi-automatic setup.



For semi-automatic setup.



Manufacturers of all types of adjustable, fixed center and individual lead screw tapping heads.

US DRILL HEAD

THE UNITED STATES DRILL HEAD COMPANY

BURNS STREET • CINCINNATI 4, OHIO

Photo courtesy of Klein Supermarkets, Inc., St. Paul-Minneapolis

Colored stripes that roll on dry!

Lane marking stripes that simply roll onto the floor . . . are perfectly dry and ready for traffic the minute they're applied. "Scotch" Brand Plastic Tape sticks at a touch to any clean, dry surface. Stripes last up to 2 years; are unaffected by acids, greases, salts, and most commercial solvents; give an overall saving of 30%. Eight easy-to-match colors: red, green, black, orange, blue, yellow, white, brown. Ask your regular tape distributor for further information or send for folder described at right.

Always specify "Scotch" Brand, the quality tape . . . and stick with it!

PLASTIC TAPE . . . *one of more than 300 pressure-sensitive tapes for industry, trademarked . . .*

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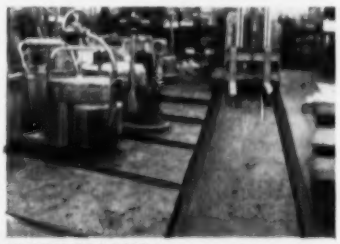
SCOTCH BRAND

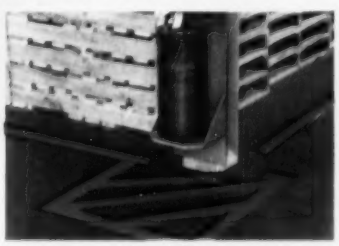
The term "Scotch" is a registered trademark of Minnesota Mining and Manufacturing Co., St. Paul 6, Minn. Export Sales Office: 99 Park Avenue, New York 16, N.Y. In Canada: P.O. Box 757, London, Ontario.

Look what you can do with it!



MARK TRAFFIC lanes, parking areas, etc. for faster, safer traffic movement. No production shut-downs are necessary when floors are marked with "Scotch" Brand Plastic Tape — there's no mess, no drying time.

STORAGE AREAS are separated from work zones with markings of "Scotch" Brand Plastic Tape. Eight colors let you code markings for every purpose; floor may be cleaned with usual methods.



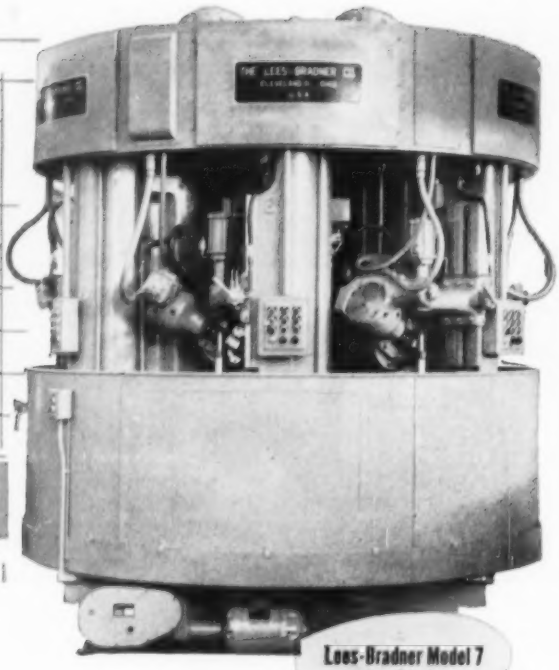
KEEP fire extinguishers, emergency equipment, etc. in the clear by marking areas with patterns of "Scotch" Brand Plastic Tape. Vivid tape stripes can also mark obstacles, projections, danger points.

SEND FOR FREE FOLDER describing properties of "Scotch" Brand Plastic Tape and showing how you can use it in your plant. Just write on your letterhead to 3M Co., St. Paul 6, Minn., Dept. MA-56.

LEES-BRADNER

Sets the HOBBING pace for tomorrow

with 6 machines in 1



Lees-Bradner Model 7 HD 8" x 20" 6-Spindle Rotary Hobber. Also available in single and 4-spindle models.

Here's a complete hobbing production line in one space-saving unit.

Actually the Lees-Bradner Model 7, HD 6-Spindle Hobber is six separate and independently operative machines in one. Each hobbing unit incorporates basically the same automatic, high-production features as the remarkable 7 HD Single Spindle Hobber. This includes a heavier, more rugged headstock, heavy-duty column and a 10 H. P. motor.

This amazingly efficient machine not only saves valuable floor space but, with its pushbutton controls and automatic features, actually controls the operator thus reducing the chance for human error or slowdown. Chips and coolant are easily carried away from the headstock by the elimination of flat surfaces.

So, if your manufacturing space is valuable and high unit production important, ask your Lees-Bradner representative to give you the story on the ultra-efficient 6-spindle rotary hobber. Write or wire us direct for his name and address in your area.

View of new HD headstock with increased bearing surface between column and headstock, heavier casting, coolant and chip carry-away.

8-Spindle 7-A Rotary Hobbers also available.

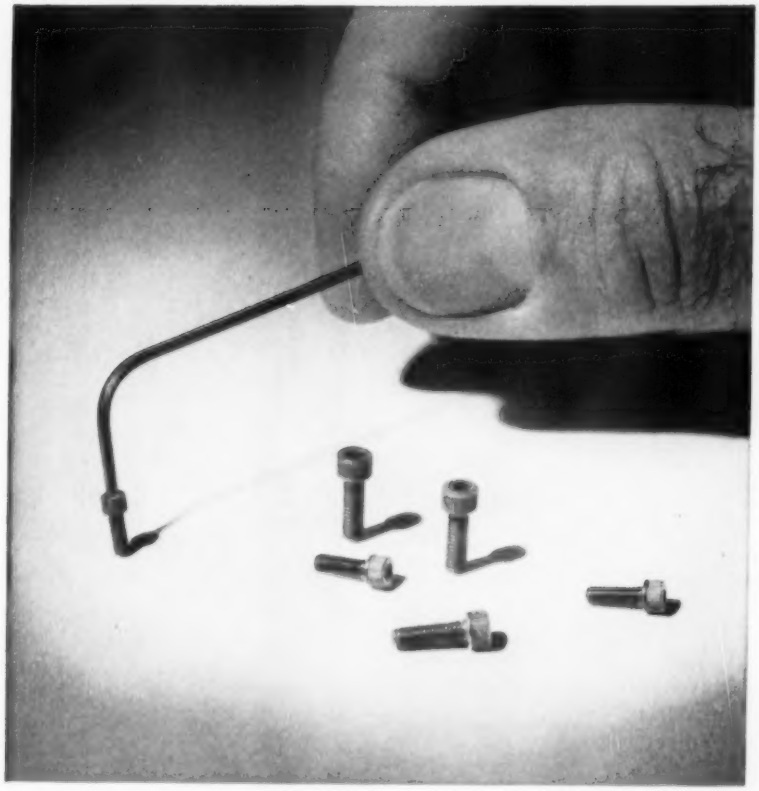
the LEES-BRADNER Company

CLEVELAND 11, OHIO, U.S.A.

MODEL 8 HOBBER · HT THREAD MILLER · 7-HD ROTARY HOBBERS · COLGAN THREADING MACHINES · MODEL 40 THREAD MILLER · SH SPLINE HOBBER · 12-S HOBBER

IF YOU THREAD OR HOB . . . GET A BETTER JOB WITH A LEES-BRADNER

Miniature screws aid standardization of small devices



Standard UNBRAKO miniature socket head cap screws are available in sizes # 0, # 1, # 2 and # 3, in heat treated alloy steel or stainless steel, at your authorized industrial distributor's. Standard lengths range from ⅛ to ½ in.

Tiny close-tolerance Unbrako screws available in standard sizes

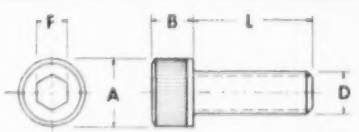
New economies in the design of space-saving miniature equipment are possible with these UNBRAKO miniature socket head cap screws. Manufactured to timepiece precision, available locally, they save the costly necessity of designing special screws to fasten tiny parts in compact units. They're ideal for use in typewriters, calculators and computers, servomechanisms, electric and electronic equipment—and in countless other small, intricate devices where maximum reduction in bulk and weight is required with no sacrifice in strength of individual components or assemblies.

Fingers grip the knurled heads on these tiny screws positively for easy handling and fast assembly. Uniform hex sockets assure maximum wrenching torque. Controlled fillets under the heads prevent shearing of the heads. Threads are fully formed for maximum strength and exact fit. Extremely accurate head diameters permit their use in countersunk holes, saving weight by reducing the length of the screw required and making flush designs possible.

These standard UNBRAKO miniature screws are available at your authorized industrial distributor's. See him today. Or write us for Bulletin 2055 and samples. Unbrako Socket Screw Division, STANDARD PRESSED STEEL Co., Jenkintown 1, Pa.

HEAT-TREATED ALLOY STEEL

Class 3 Fit Standard



	Diameter	Threads per Inch NC	Threads per Inch NF	Length	Recommended Installation Torque in Inch-Pounds NC	Recommended Installation Torque in Inch-Pounds NF	Weight per 1000 in Pounds
#0	A .104		80	⅛		2.0	.152
	B .060		80	3/16		2.0	.182
	D .060		80	¼		2.0	.210
	F .050		80	⅜		2.0	.265
#1	A .118		72	⅛		3.5	.27
	B .073		72	3/16		3.5	.32
	D .073		72	¼		3.5	.37
	F .050		72	⅜		3.5	.47
#2	A .140	56		3/16	6.0		.42
	B .086	56		¼	6.0		.50
	D .086	56		⅜	6.0		.58
	F 1/16	56		½	6.0		.70
#3	A .161	48		3/16	8.5		.59
	B .099	48		¼	8.5		.70
	D .099	48		⅜	8.5		.81
	F 5/64	48		½	8.5		1.03

Standard Screws are threaded to the head. Special materials, lengths, and threaded lengths are available. One "High-Titan" UNBRAKO hex key is included with each package of 100 screws.

UNBRAKO®

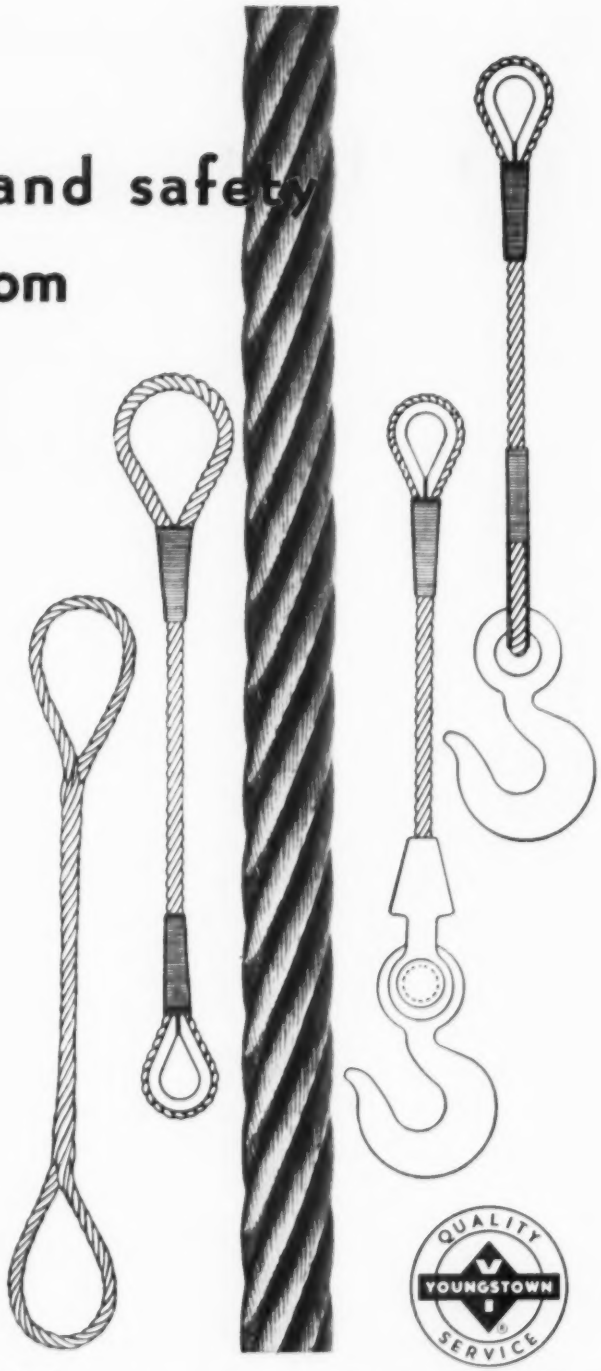
SOCKET SCREW DIVISION

STANDARD PRESSED STEEL CO.

SPS

JENKINTOWN PENNSYLVANIA

Where strength and safety count, rope wire from Youngstown does the job!



Long experience in the manufacture of wire rope and rope fittings has taught Upson-Walton all the ins-and-outs of this business. Theirs are quality products, long noted for strength and safety. And, these qualities of strength and safety become inherent in Upson-Walton products with the selection of the basic material: Youngstown Yolectro Rope Wire.

For, Youngstown offers the most vital requirement of wire for wire rope—that of uniformity. Controlled and painstaking steel processing are the reasons why; extra strong and flexible rope wire, easy to form and yet tough enough to meet the approval of the most critical rope manufacturers and users is the result.

Youngstown Bright and Galvanized Yolectro High Carbon Rope Wire is furnished in all AISI grade designations. Phone or write our nearest District Sales Office

QUALITY YOUNGSTOWN SERVICE

Youngstown YOLECTRO HIGH CARBON ROPE WIRE

THE YOUNGSTOWN SHEET AND TUBE COMPANY *Manufacturers of Carbon, Alloy and Yoloy Steel*

General Offices Youngstown, Ohio District Sales Offices in Principal Cities.

SHEETS - STRIP - PLATES - STANDARD PIPE - LINE PIPE - OIL COUNTRY TUBULAR GOODS - CONDUIT AND EMT - MECHANICAL TUBING - COLD FINISHED BARS - HOT ROLLED BARS - WIRE - HOT ROLLED RODS - COKE TIN PLATE - ELECTROLYTIC TIN PLATE - BLACK PLATE - RAILROAD TRACK SPIKES - MINE ROOF BOLTS

a MIGHTY fine press...

built to withstand rigorous service

From crown to base, Minster S1's are truly MIGHTY presses. You get these features as Standard Construction:

- ★ Box type cast construction for maximum rigidity
- ★ All wear surfaces bronze lined, precision fitted and replaceable
- ★ Minster patented Combination Multiple Disc Air Friction Clutch and Brake
- ★ Exceptional Slide guiding and barrel type adjustment
- ★ Air Counterbalances on slide
- ★ Totally enclosed gears running in oil
- ★ J. I. C. Dimensions

MINSTER
series **S1**
straight side single point presses

for drawing, forming, trimming or blanking.

capacities from 50 to 600 tons

Photo courtesy of Long Manufacturing Division, Borg-Warner Corporation, Detroit, Michigan. Minster S1-500 Press used in production of clutch coverplates for the automotive industry.

THE MINSTER MACHINE COMPANY
Minster, Ohio

MINSTER

CEILINGS ARE PUT TO WORK

(above) as part of Whirlpool-Seeger's twenty miles of overhead trolley conveyors provides economical, live storage of unfinished cabinets at the St. Joseph plant. Modern assembly-line techniques (right) are used in the manufacturing of all products: domestic clothes washers, ranges, refrigerators, home freezers and air conditioners. A total of 7-1/2 million square feet of space is devoted to manufacturing in plants at St. Joseph, Michigan; Clyde, Marion and Hamilton, Ohio; Evansville and LaPorte, Indiana; and St. Paul, Minnesota.

American Machinist Spearheads Your Sales...

at Metalworking plants such as Whirlpool-Seeger where 94.5% of purchase dollars goes for the *machinery, materials, parts and supplies* needed for production . . .

. . . and as you would expect Whirlpool-Seeger Corporation's purchasing pattern is typical of most Metalworking companies.

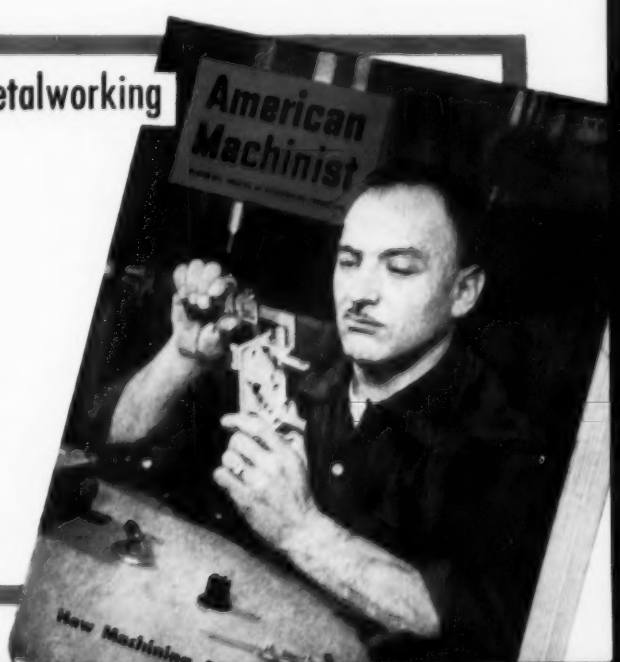
When these purchases are made, you find that production executives and engineers, in Metalworking plants everywhere, exert the primary influence in choice-of-brand. For theirs is the responsibility to create Metalworking's multi-billion dollar outflow of goods.

The sure way to establish *your* brand with these men who influence the biggest share of purchases . . . to get and keep recognition . . . to minimize "pioneering" and "cold" sales work . . . is through the advertising pages of American Machinist.

Preferred by Metalworking production executives and engineers—it's *subscribed* to by over 37,000 of them—more than any other Metalworking magazine.

. . . bought by the men who buy for Metalworking

ABP ABC



The McGraw-Hill Magazine of Metalworking Production
McGraw-Hill Building, New York 36, N. Y.

Published every other Monday
Member of the Audit Bureau of Circulations
and the Associated Business Publications

Farval provides foolproof lubrication for 50-spindle drilling machine

FARVAL—
Studies in Centralized Lubrication
No. 181

GOOD lubrication plays a vital part in the success of any drilling machine. It boosts output, cuts costs and extends machine life.

Barnes Drill Company of Rockford, Illinois, has offered its customers the benefit of Farval Centralized Lubrication since 1945. Thousands of bearings on Barnesdril equipment are being protected by over 100 factory-installed Farval systems.

What Farval does

As a machine user, you, too, can get that extra production and protection with Farval. Standardize your lubrication by placing Farval on all types of equipment throughout your factory. Farval lubricates while the equipment is in operation, delivering a measured amount of clean lubricant to every bearing whenever necessary. No bearings are ever missed.

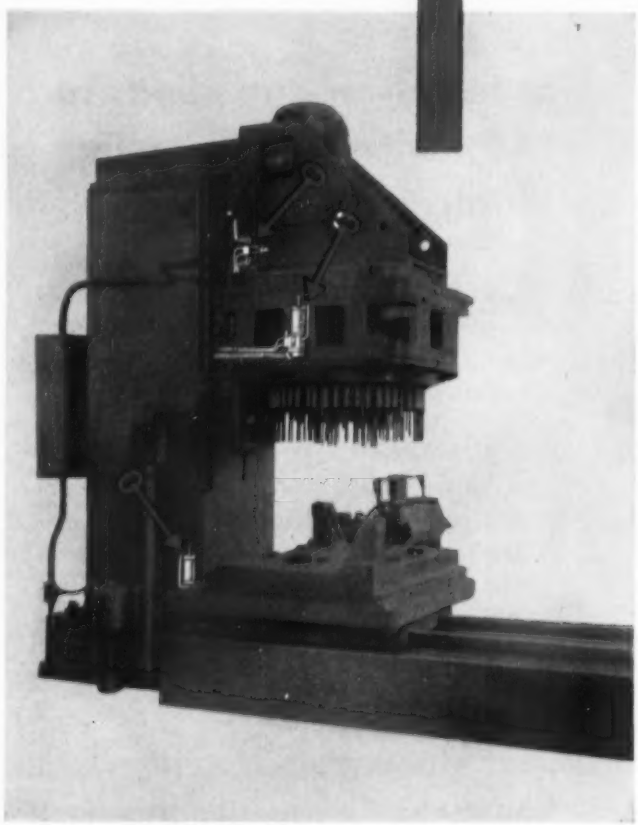
Farval measuring valves automatically distribute the correct charge to each bearing throughout the system circuit. Farval sends the lubricant from a conveniently located pumping unit, eliminating machine shutdown time and providing an unparalleled degree of safety.

Free lubrication survey

Whether your equipment is old or new, a Farval Centralized Lubrication System will serve it better. We would be glad to send one of our lubrication engineers to inspect your plant equipment. He will present a written analysis of what Farval can do for you—without obligation, of course. The savings will look good. Ask for Bulletin 26-R.

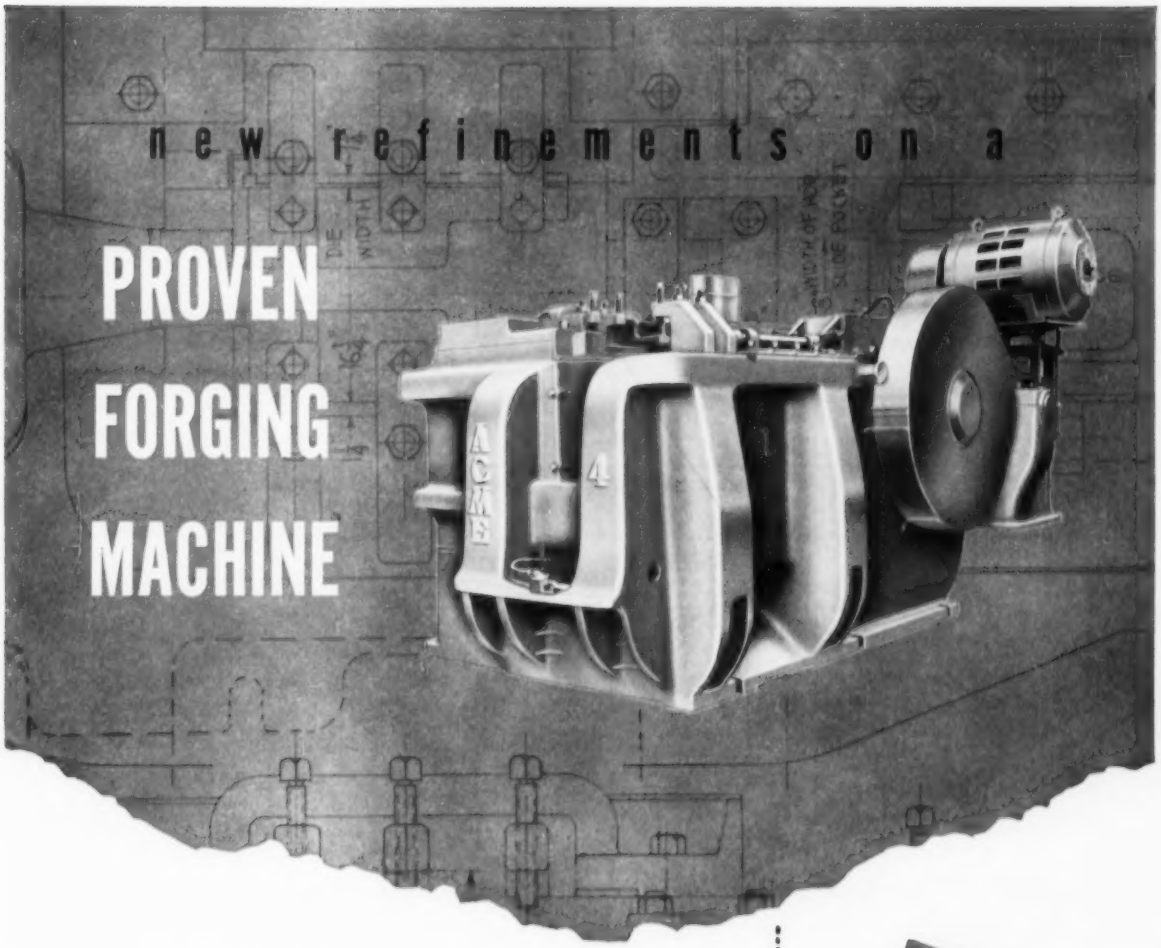
The Farval Corporation, 3254 East 80th Street, Cleveland 4, Ohio.

Affiliate of The Cleveland Worm and Gear Company, Industrial Worm Gearing. In Canada: Peacock Brothers Limited.



KEYS TO ADEQUATE LUBRICATION— **Wherever you see the Farval valve manifolds, dual lubricant lines and central pumping station, you know a machine is being properly lubricated.**

This *Farvalized* special vertical drilling machine, built by Barnes for a Midwestern aircraft engine manufacturer, is a saddle-type unit, arranged with a 50-spindle adjustable center auxiliary head with slip-type spindle construction.



ACME XN 4" upset forging machine with the most powerful grip ever built into ANY forging machine. Plus additional Nitroloy liners for even greater product accuracy. Other improvements insure Higher Output, Lower Maintenance, and Longer life.

The whole story is told in this new catalog of the complete line of ACME XN Forging Machines showing all models with specifications and details of construction PLUS fifteen illustrated technical articles explaining in detail some of the modern methods of upset forging on unusual pieces.

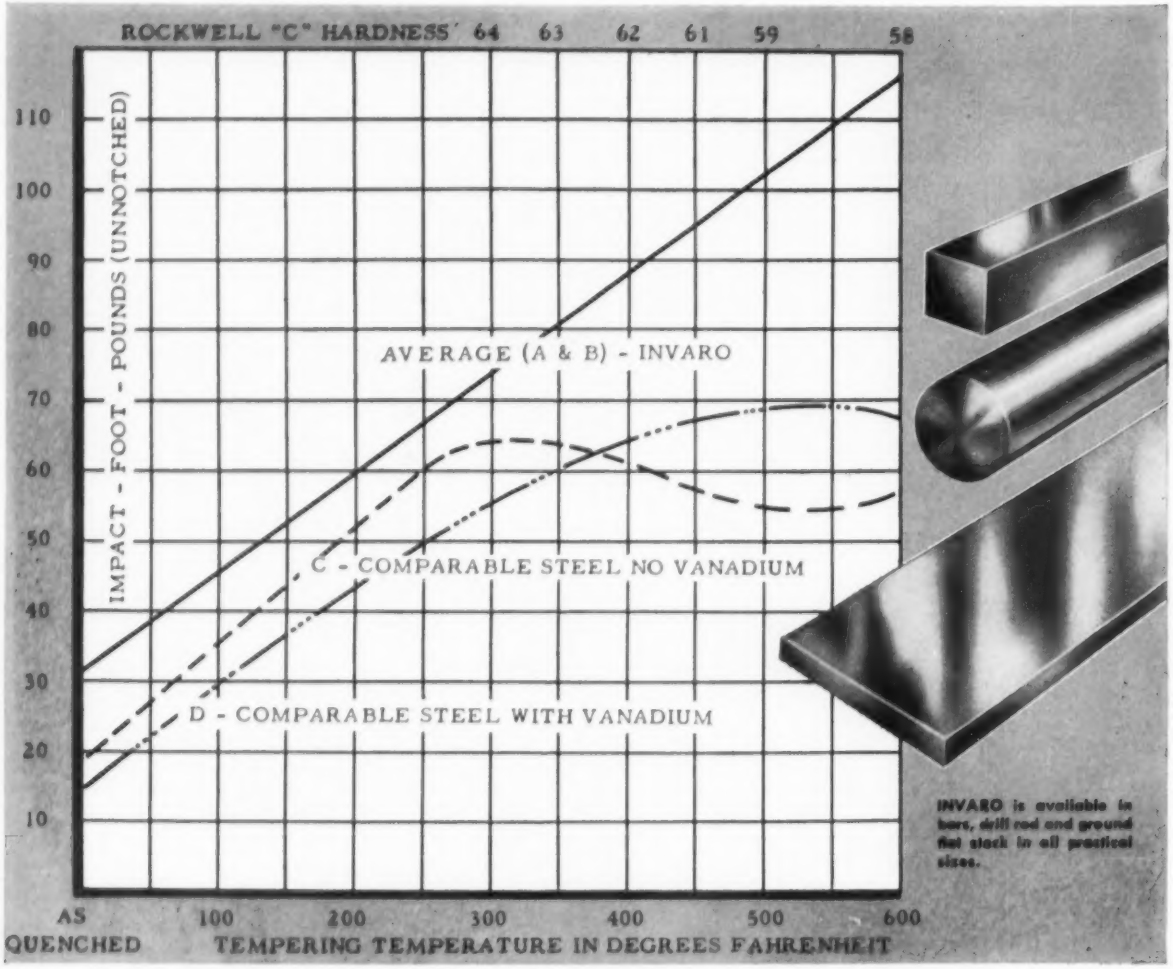
It's Yours For The Asking!

THE HILL ACME COMPANY

ACME MACHINERY DIVISION • **1209 W. 65th St., Cleveland 2, Ohio**

ESTABLISHED 1882

"ACME" FORGING • THREADING • TAPPING MACHINES • ALSO MANUFACTURERS OF "HILL" GRINDING & POLISHING MACHINES
HYDRAULIC SURFACE GRINDERS • "CANTON" ALLIGATOR SHEARS • BILLET SHEARS • "CLEVELAND" KNIVES • SHEAR BLADES



INVARO . . . *IZOD-PROVED* THE TOUGHEST

of leading comparable oil-hardening tool and die steels

When the toughness of a tool and die steel is the critical factor of selection, Firth Sterling INVARO is the *toughest* of the tough! That's not just an opinion but a *fact.* Undeniable proof is established by the A.S.T.M. Izod Impact Test, results of which are graphically shown above, comparing steels both with and without vanadium.

INVARO shows a superior toughness in *all* ranges of temperature from a minimum advantage of about 12% to as much as 100% greater! This marked superiority is the result of Firth Sterling's advanced metallurgical practices combined with 67 years of experience in the art of making specialty steels.

Yes, when you want *toughness* in your tools and dies, combined with uniformity, excellent hardening properties and safety in heat treating . . . specify INVARO.

Chemical Analysis	*All test samples were machined from half-inch annealed bar stock.*							
	C	Si	Mn	S	P	W	V	Cr
Invaro A	.88	.34	1.22	.010	.020	.49	.19	.50
Invaro B	.94	.25	1.20	.014	.013	.53	.22	.49
Comp. C	.90	.33	1.24	.011	.025	.50	—	.55
Comp. D	.95	.34	1.27	.010	.020	.50	.21	.59

Firth Sterling

—INC—

GENERAL OFFICES: 3113 FORBES ST., PITTSBURGH 30, PA.

MILLS: McKEESPORT, TRAFFORD, DETROIT, HOUSTON

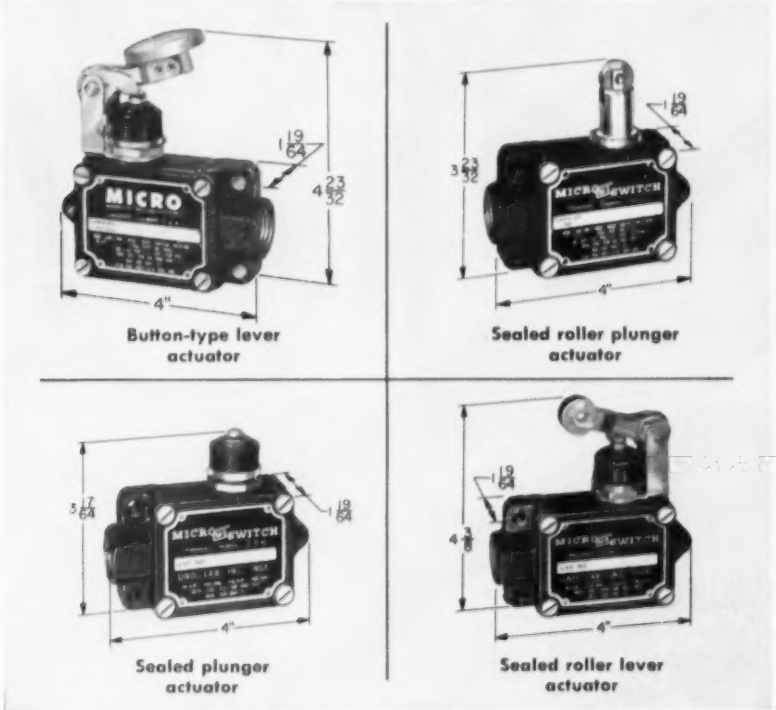
OFFICES AND WAREHOUSES*: BIRMINGHAM CHICAGO* CLEVELAND DAYTON DETROIT* HARTFORD* HOUSTON LOS ANGELES* NEW YORK PHILADELPHIA PITTSBURGH WASHINGTON WESTFIELD, N.J.

PRODUCTS OF FIRTH STERLING METALLURGY

High Speed Steels
Tool & Die Steels
Stainless Specialties
High Temperature Alloys
Sintered Tungsten Carbides
Firth Heavy Metal
Chromium Carbides
High Temperature Cermets
Zirconium

MICRO precision switches

...THEIR USE IS A PRINCIPLE OF GOOD DESIGN



High-Capacity enclosed switches for plant applications with heavy electrical loads

Many plant applications call for installation of switches which have more than average electrical capacity. MICRO SWITCH high-capacity enclosed switches meet this requirement with the capacity to make and break steady state currents of 20 amperes, 125, 250, or 460 volts a-c. They will handle inrush currents as high as 75 amperes — switch 10 amperes 125 volts when controlling tungsten filament lamp loads on a-c circuits.

All the types shown are available for either right- or left-hand mounting. They are widely used on present plant equipment as safeties, limits, and interlocks.

Button-type lever actuator: This actuator can be adjusted horizontally through 360° and vertically through 225°. The actuator is sealed with an elastomer (neoprene) boot. The switch is for manual operation.

Sealed plunger actuator: An elastomer boot covers the operating plunger and a ring gasket seals the cover. Die-cast aluminum enclosure protects the basic switch from vibration and shock.

Sealed roller plunger actuator: For cam or slide operation in applications where the approach of the actuating device is not parallel to the switch. Roller plunger assembly adjustable through 360°. Seals prevent entrance of dust, dirt, or moisture.

Sealed roller lever actuator: Well adapted to operation by any type of operation—straight line or cam. Roller lever can be locked in any position at intervals of .2 degrees within a range of 225°. Entire roller bracket can be rotated horizontally through 360° and tightened down in any position.

These switches are typical of a wide variety of MICRO precision switches which have proved successful in making existing machinery safer, more automatic, and more productive.

Basic Switch is Replaceable

The basic switch can be easily replaced, if necessary, without removing the enclosure from its mounting. Ample wiring space within the enclosure and the side facing terminals of the basic switch simplify wiring.

Underwriters' Laboratories Listing

1 H.P. 115 volts a-c

2 H.P. 230 volts a-c

20 amperes 125, 250, or 460 volts a-c

½ ampere 125 volts d-c

¼ ampere 250 volts d-c

Send for Catalog 101 "Switches for Industry"

MICRO precision switches are carried in stock by distributors in every key city. Look under "Switches, Electric" in the Yellow Pages.

MICRO SWITCH

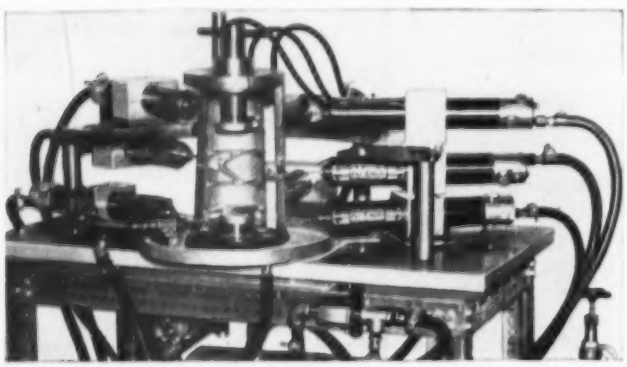
A DIVISION OF MINNEAPOLIS-HONEYWELL REGULATOR COMPANY

In Canada, Leaside, Toronto 17, Ontario • FREEPORT, ILLINOIS

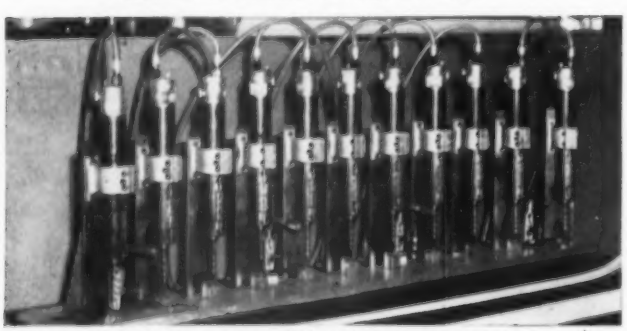
Save on Holes!

ONLY $175.00

ARO Par-A-matics drill 5/16" and 5/32" holes in sub-assemblies of aluminum awnings.



Eight holes are drilled in a cast aluminum sanding drum in 4 to 5 seconds with ARO Par-A-matics.



ARO Par-A-matics drill eleven holes at a time, automatically, in curved molding strip for automotive trim.

SWITCH TO ARO PAR-A-MATIC DRILLING UNITS

LOW INVESTMENT . . . You can drill any number of holes simultaneously, at *extremely low cost*, with ARO Par-A-matic Drilling Units!

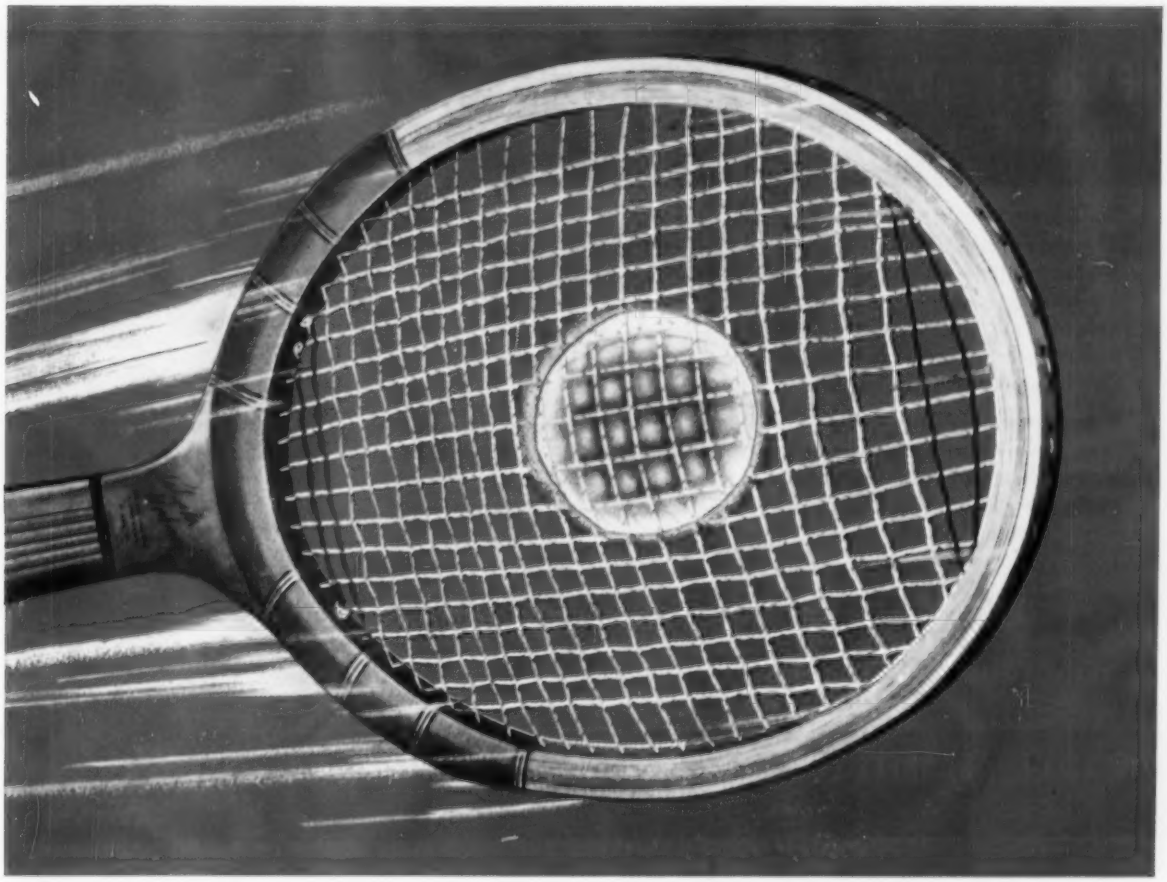
LOW MAINTENANCE . . . Par-A-matics are air-operated . . . simple to set up and maintain . . . precision-made . . . performance proved.

LOW CENTER-TO-CENTER DISTANCE . . . compact design permits use where space is a factor.

FLEXIBILITY OF SET UP . . . Adjustments are quick and simple. Adjustable stroke length . . . variable rate of feed. ARO Field Engineers offer full assistance in planning multiple Par-A-matic installations. Write for bulletin 5546-T.

THE ARO EQUIPMENT CORPORATION, Bryan and Cleveland, Ohio
Aro of California, 4131 S. Grand Ave., Los Angeles 7
Aro Equipment of Canada, Ltd., Toronto 15, Ontario
Offices in All Principal Cities

ARO® AIR TOOLS
Also . . . Air Hoists . . . Lubricating Equipment . . . Aircraft Products . . . Grease Fittings . . .



"Finish first in your league"
...with J&L COLD FINISHED JALCASE STEELS

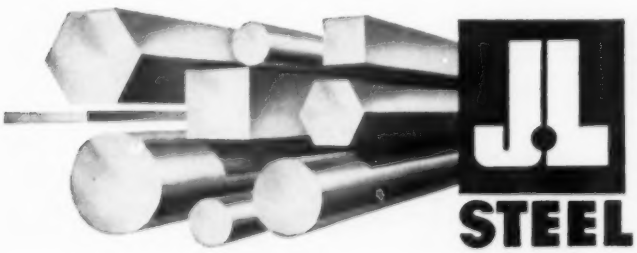
Cold Finished Jalcase—now available in 10 SAE and AISI grades—is the original free-cutting open hearth steel having the mechanical properties required for special service machined parts. And it's especially suitable for heat treating. This grade is one of a complete line of premium quality, free-machining bar steels developed over the years by J&L specialists. Thus, we can recommend the right type to help solve your particular problems.

Fundamental advantages of Jalcase are:

- Easy, consistent machinability
- Minimum distortion
- Fast, uniform response to heat treatment
- High wear resistance
- Improved cold-drawn mechanical properties

Adequate stocks are available in important industrial centers. Phone the nearest J&L District Office or your Distributor today for prompt and efficient service.

Pick the Free-Machining Steel that serves you best—from J&L's complete Cold Finished Line



Jones & Laughlin
STEEL CORPORATION · PITTSBURGH

COLD FINISHING PLANTS AT
PITTSBURGH, PA., AND HAMMOND, IND.

BARRETT "FILWHIRL" ENAMELERS make easy work of many difficult coating problems

The Barrett "Filwhirl" is a Centrifugal Enameler providing a clean, sure and economical way of applying finishing materials to parts or products that can be rotated in fair balance in the revolving bowl. It wastes no coating material, and reduces time and expense when compared with other methods of applying a good commercial finish. It is designed for bulk handling, and can be depended upon for speedy production requirements.

It has proven highly successful in the coating of helical springs, clips, clasps, zipper parts, bead and link chain, toys, automobile and luggage hardware, misc. metal stampings, castings, etc. Excellent results are also obtained with japan, lacquers, varnishes, paints, waxes. No drips or fatty edges.

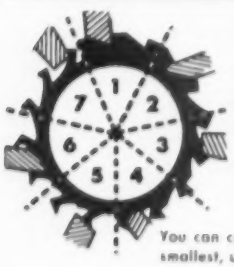
Furnished in spindle post, fixed bowl, and carrier types in several capacities. Safety features included and auxiliary equipment is available.

Send a few representative samples to be processed and submitted for your examination.

The Barrett Centrifugal Enameler.

THE LEON J. BARRETT COMPANY, 1800 Grafton Road, **WORCESTER, MASS.**

Designers and Builders of Centrifugal Machinery



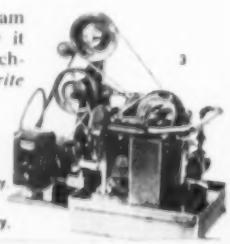
Just think!

7 SEPARATE MILLING OPERATIONS ON THIS ESCAPE WHEEL *(Enlarged View)*

You can cut *any size you require* – from the very smallest, up to large size clock escape wheels.

If timing mechanisms are a problem you should know more about the Waltham Process. Many of the leading watch and clock manufacturers of the country are producing Escape Wheel teeth of complicated shape by the Process which is in brief: (1) Dies of precise dimension, (2) Sub Presses which are precision die sets for utilizing these dies, (3) A semi-automatic cutting machine of absolute accuracy to produce smooth-finished, close-tolerance escape wheels.

The complete story of the Waltham Machine Works Process and how it can help you with your timing mechanisms is yours for the asking. *Write us today!*



1 Dies meticulously machined to your exact specification.

2 Sub Presses to maintain die alignment with long lived accuracy

3 An Escape Wheel cutting mechanism of the highest accuracy.

WALTHAM MACHINE WORKS, INC.

High Street, Waltham, Mass.

HAVE YOU CHECKED YOUR *COUNTERSINKING COSTS* LATELY?

A *Severance* CARBIDE ECONO-SINK WILL GIVE YOU —

- INCREASED ACCURACY
- MORE PRODUCTION
- SMOOTHER SEATS
- LONGER CONSISTENCY OF OPERATION
- LESS DOWN-TIME
- AND A COMPLIMENT FROM THE BOSS FOR SUGGESTING THE CHANGE

Chatter-Free DESIGN Solid CARBIDE CUTTING HEADS

MAKE THE Switch to Carbide BEFORE IT'S TOO LATE

WITH THE NEW Severance CARBIDE ECONO-SINK YOU GAIN ALL THE ADVANTAGES OF CARBIDE TOOLING – AND AT LESS COST per Countersunk Hole

Ask for Information & Prices TODAY!

Severance TOOL INDUSTRIES INC.

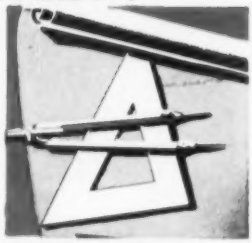
726 IOWA AVE., SAGINAW, MICH.

Representatives and Distributors in all principal areas.

6 reasons for checking your Commercial Heat Treater First

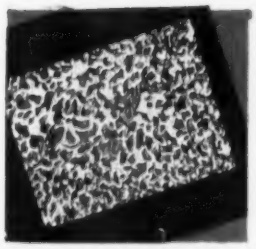
HE PROVIDES . . .

1



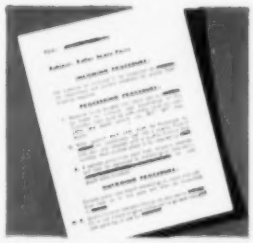
Guidance in Steel Selection and Design

2



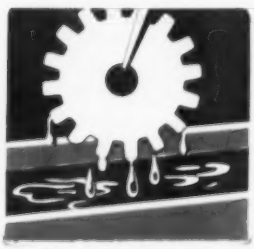
Metallurgical Understanding of Metal Properties

3



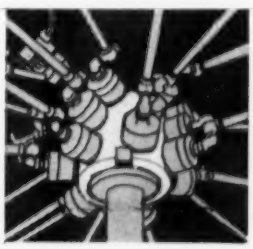
Assistance in Proper Preparation of Parts for Heat Treating

4



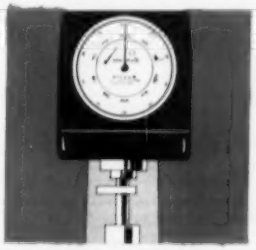
Knowledge through Experience of the Right Heat Treat for the Job

5



Extensive array of Equipment and Facilities

6



Final laboratory and non-destructive Testing

Whenever your production requirements for a new product or the redesign or improvement of an old one mean the installation or expansion of heat treating activities, it will pay you to check with your Commercial heat treater before tackling the job yourself.

The 6 basic reasons for this are shown above. Remember the Commercial Heat Treater has the skill, the experience, the equipment; — all under one roof ready to serve you.

THERE'S A HEAT TREATING SPECIALIST NEAR YOUR PLANT

American Metal Treatment Co.
Elizabeth, New Jersey
Allied Metal Treating Corp.
Kenosha; Manitowoc; Port Washington, Racine, Wisconsin
Anderson Steel Treating Co.
Detroit, Michigan
B. & W. Precision Heat Treating Co.
Kitchener, Ontario, Canada
Benedict-Miller, Inc.
Lyndhurst, New Jersey
Bennett Heat Treating Co., Inc.
Newark 3, New Jersey
Commercial Metal Treating, Inc.
Bridgeport, Conn.
Cook Heat Treating Co. of Texas
Houston 11, Texas
The Dayton Forging & Heat Treating Co.
Dayton 3, Ohio
Domiay Heat Treating Corp.
Dallas, Texas
Drever Company
Philadelphia 33, Pennsylvania
Greenman Steel Treating Company
Worcester 5, Massachusetts

M.T.I.
METAL TREATING INSTITUTE

Fred Heinzelman & Sons
New York 12, New York
Alfred Heller Heat Treating Co.
New York 38, New York
Hollywood Heat Treating Co.
Los Angeles 38, California
L-R Heat Treating Company
Newark, New Jersey
The Lakeside Steel Improvement Co.
Cleveland 14, Ohio
Metallurgical, Inc.
Minneapolis 14, Minnesota
Metallurgical, Inc.
Kansas City 8, Missouri
Metlab Company
Philadelphia 18, Pennsylvania
Metro Heat Treat Co.
New York 13, New York
New England Metallurgical Corp.
South Boston 27, Massachusetts
Paulo Products Company
St. Louis 10, Missouri
Pittsburgh Commercial Heat Treating Co.
Pittsburgh 1, Pennsylvania
The Queen City Steel Treating Co.
Cincinnati 25, Ohio
J. W. Rex Company
Lansdale, Pennsylvania
Stanley P. Rockwell Company
Hartford 12, Connecticut
C. U. Scott & Son, Inc.
(Stainless Steels)
Rock Island, Illinois
Standard Steel Treating Co.
Detroit 10, Michigan
Syracuse Heat Treating Corp.
Syracuse, New York
Winton Heat Treating Company
Cleveland 16, Ohio

YOU GET *SPEED*

PLUS ACCURACY

WITH MOORE JIG GRINDERS

HOLES from 1/64" to 8" Relocated and Ground within .0001" in One-Third Previous Time

Before hardening, this two-station die block was Moore-Jig-Bored to eliminate the need for excessive grinding. After hardening and surface grinding, all holes were Moore-Jig-Ground to exact size and location. Blank hole and center piercing hole were ground with ½° included taper. Little clearance could be allowed between punch and die. Jig grinding time: *only 2¼ hours.*

CONTOURS, Too, Accurately Jig Ground and Checked in One Setting

This flanged punch, impractical to grind by any other method, was a natural for the No. 2 Moore Jig Grinder. All radii—male and female—were ground accurately to location and size. The piece, having been set up on a rotary table, was aligned to permit grinding of the angular surfaces. And the entire contour was inspected by the "indicator measuring" method while the punch was still on the machine.

The word "versatile" must have been coined for the No. 2 Moore Jig Grinder. Not only does this machine relocate and grind straight and tapered holes with ease, but it contour grinds, chop grinds and slot grinds just as skillfully.

The Moore Jig Grinder, together with its toolroom teammate, the Moore Jig Borer, enables tool and die sections to be produced concurrently, puts diemaking on an interchangeable-parts-and-assembly basis. And it's also a time-saver on production jobs.

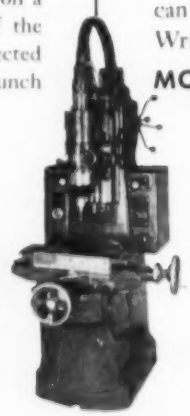
Employing the accurate lead screw measuring principle and a convenient system of coordinate hole location, the fast and sure Moore Jig Grinder eliminates hours of checking on bench and surface plate.

Why not find out how this remarkable machine can save *you* sizeable chunks of time and money. Write today for our detailed bulletin.

MOORE SPECIAL TOOL COMPANY, INC.
738 Union Ave., Bridgeport 7, Conn.

MOORE TOOLS

see our catalog in MACHINE TOOL CATALOGS or write for copy



NO. 2 MOORE JIG GRINDER
Range 10" x 16" x 16" height. Grinding speeds from 12,000 to 60,000 rpm. Infinite feeds up and down; spindle-housing heat control. Features slot grinding attachment.

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For Every Carbide Drilling Application There's a STANDARD SUPER DRILL

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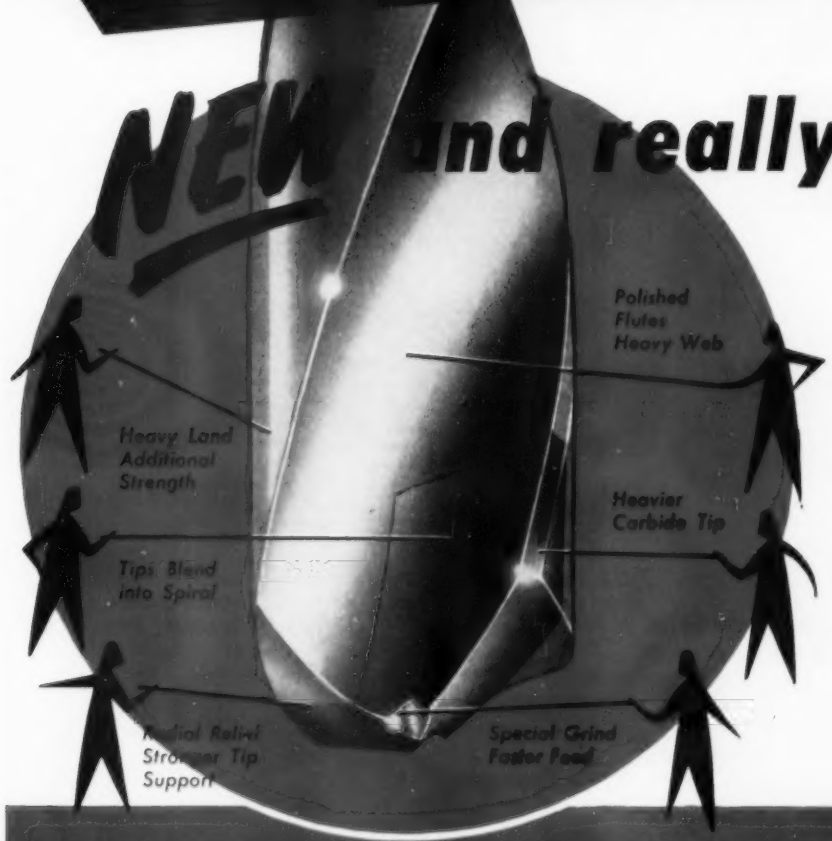

Six points of superiority—Result of two years' research. Extensive tests indicate it's the most durable and the fastest cutting carbide twist drill developed to date. Feeds as high as 8" per minute in cast iron have been obtained. Stocked in fractional, wire and letter sizes for your convenience.

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Get production off to a profitable start! Use Columbus Die-Tool engineered tools. Jigs, Fixtures, and Special Machinery individually designed and built to produce your product alone . . . at a rate to match your production schedule. That's production economy! That's the wisdom of CDT special machinery! That's how Columbus Die-Tool can put your production on a profitable basis. Columbus Die-Tool are specialists in building special tools, jigs, fixtures and machinery . . . have been for over 50 years. Talk over your special problems with us. Absolutely no obligation. Write today.

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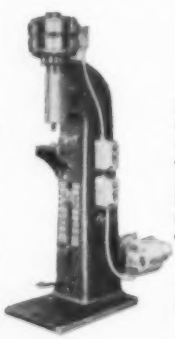

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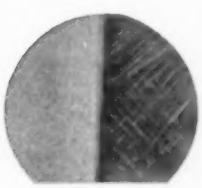
V-B Liquid Honing*

Your Way to Say:

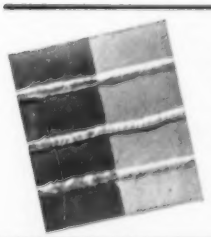
"MOST MODERN PRODUCTION BLASTING EVER DEVELOPED!"

This Machine Should be Processing Your Parts

Vapor Blast Liquid Honing removes heat treat scale faster than conventional tumbling or any other process, and without pitting the steel.



Vapor Blast Liquid Honing blends out grind lines, as shown in the area to the left. The smooth, non-directional surface is ideal for oil flow and unequalled lubrication. Liquid-abrasive action also hones down tiny burrs along the edges of parts like this one.



This unretouched photo of three weld seams shows how efficiently you can remove mill scale, rust, welding and heat discolorations. Top weld is stainless steel; next, copper brazing; bottom, common steel.

For surface conditioning or finishing, a switch to Liquid Honing will save you a superintendent's pay in a year or less. Metals, plastics, ceramics — any material you use — can be Liquid Honed fast and to close tolerance. You get a better production job every time . . . at lower cost and without usual danger to the operator.

Send a sample scale-covered part with a letter describing your problem. Liquid Honing engineers will remove the scale and return the part with their recommendations. No cost to you . . . no obligation.

VAPOR V-B BLAST
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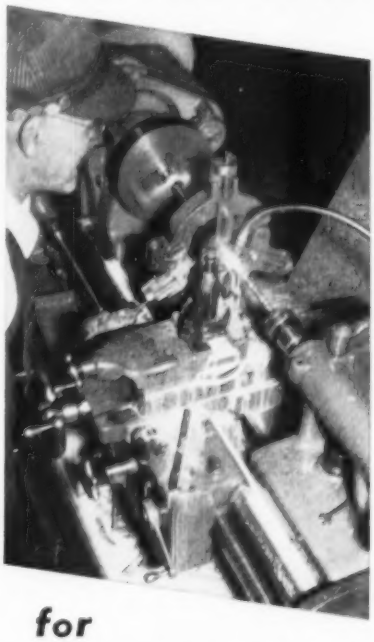
SOUTH BEND 14½" LATHES



for FAST, PRECISION MACHINING

South Bend 14-1/2" Lathes offer many advantages for precision machining. Ease of operation, speed, power, accuracy, and efficiency are some of the features responsible for their popularity. Often the precision and quality of finish obtained with South Bend Lathes are such that subsequent grinding, honing, or lapping operations are unnecessary. Substantial savings in capital investment, power consumption, floor space, and labor costs have resulted from their installation.

Write for catalog on 14-1/2" Lathes. Also 9" to 16-24" Lathes, 7" Bench Shapers, 14" Drill Presses and 8" or 10" Pedestal Grinders.

SPECIFICATIONS

Swing — 14⅝" over bed and saddle wings
Center Distances — 24½" to 60½"
Collet Capacity — 1"
Spindle Speeds — 8, 30 to 875 r.p.m.
Power Longitudinal Feeds — 48 R.H. or L.H., .0015" to .0841"
Power Cross Feeds — 48, .0006" to .0315"
Thread Cutting — 48 R.H. or L.H. pitches, 4 to 224 per inch

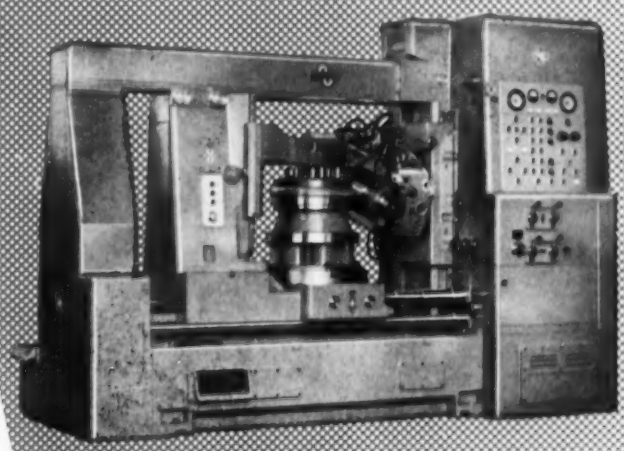
SOUTH BEND 1906 50th ANNIVERSARY 1956

SOUTH BEND LATHE

SOUTH BEND 22, INDIANA

From the *American Machinist* Library of *Tips for Top Shop Men*

ONLY two of your possessions increase in value proportionally with price inflation. One is time, the other knowledge. You can employ both productively to build security, or squander them.



FN 9

for gear diameters up to 900 mm with work-arbor support and pitches in steel up to module 9

FP 7 production machine
for gear diameters up to 600 mm with work-arbor support and pitches in steel up to module 7

DOUBLE-FRAME GEAR-HOBBING MACHINES

with programme control for all functions, shifting arrangement, automatic locking

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FP 4 production machine
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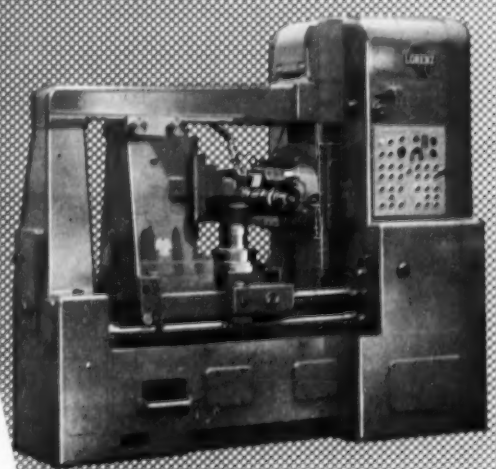

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EASE OF OPERATION
the requirements of the times

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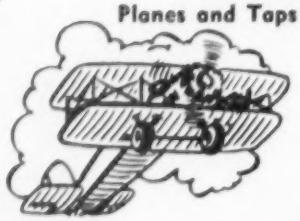
Planes and Taps were only good for short runs



TODAY...

the cutting characteristics and life of your taps are important factors in your costs of production.

BLAKE Flute and Chamfer Grinders can make substantial savings possible in your threaded-hole costs. They do this by creating or restoring:

1. Exact indexing of cutting edges.
2. Efficient rake angles for each job.
3. Correctly ground spiral points.
4. Perfectly relieved chamfers.

The accuracy and dependability of the Blake Flute Grinder and Blake Chamfer Grinder make it possible for you to do high-efficiency tapping . . . the *only* kind which pays off in profits today!

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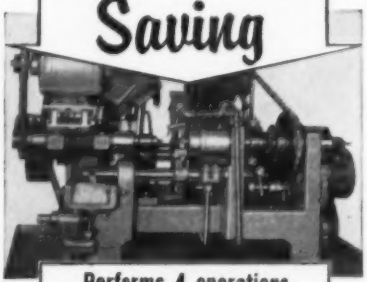
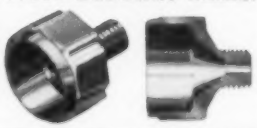
ONE TOWNSEND AUTOMATIC effects a 3-way *Saving*



Performs 4 operations *automatically*

The Townsend Special Drilling Machine mass produces oilmeter and ammeter switch housings at the rate of 1200 per hour; four separate operations by one machine to close tolerances (plus or minus .001). The four stage operation automatically **TURNS** (maintaining an accurate shoulder), **FACES-DEBURRS-DRILLS.**



SAVES manpower costs!

One man operates 6 or more Townsend Qualimatics. He fills the hopper with switch housing blanks and they come out finished . . . *automatically.*

SAVES on machinery costs!

The Townsend Qualimatic costs 1/3rd the cost of expensive multi-station machines, gives the advantages of repetitive, high-speed, accurate production with a *minimum* capital investment.

SAVES through mass production!

With Townsend Qualimatics, it is possible to pace machine capacity with production and design demand. Townsend Qualimatics mean *expandable* production.

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Part I of a new 2-part *American Machinist* Special Report, dealing thoroughly with the many devices for holding work machined during *rotation.* Sixteen pages, fully illustrated, 25 cents per copy.

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It's easy to

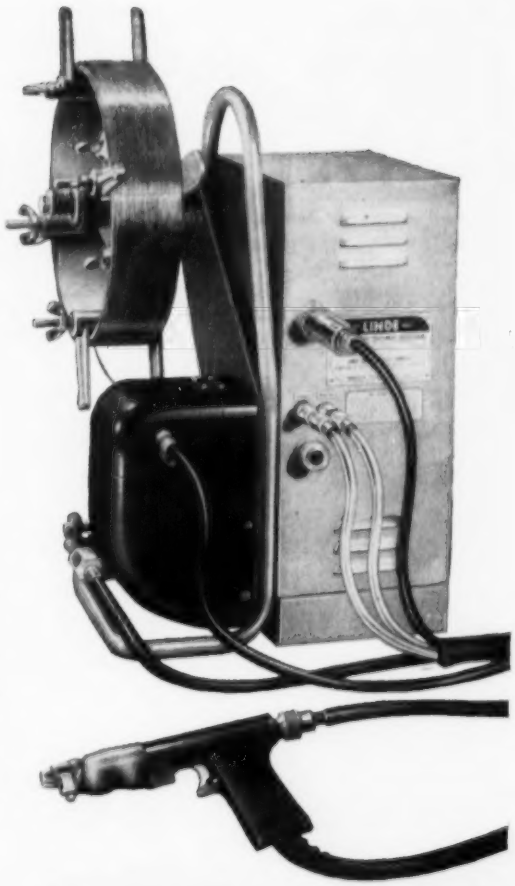
CUT WELDING COSTS

when you use a High-Speed

LINDE SWM-2

Trade-Mark

Portable Sigma Welder



Your welding department can easily make high-speed, low-cost fusion welds in aluminum, stainless steel, high temperature alloys, copper, carbon steel, and other metals with the LINDE SWM-2 Portable Sigma Welder. The LINDE SWM-2 is a complete control unit for manual sigma (Shielded Inert Gas Metal Arc) welding operations. It mechanically feeds welding wire from a coil into the weld area at a steady precontrolled rate and supplies a regulated quantity of argon to shield the weld from contamination by the atmosphere. No flux is used. In most cases the smooth, clean sigma welds need no post-welding treatment.

SIMPLIFIED AUTOMATIC OPERATION

The operator merely presses the trigger of the pistol type torch to energize the control circuit and start the flow of water coolant and argon gas. When an arc is struck by touching the consumable electrode to the workpiece, the wire feed automatically begins.

NEW CONSTANT POTENTIAL POWER SUPPLIES CAN BE USED

Either ordinary or constant potential DC power supplies can be used with a LINDE SWM-2. In constant potential welding arc voltages are preselected and held with outstanding consistency which permits positive starts and high-speed welds on thin metals.

Call your nearest LINDE office today for more information on how you can cut production welding costs with the LINDE SWM-2 Sigma (Shielded Inert Gas Metal Arc) Welder. Or write for your free LINDE SWM-2 catalog.

Production jumped 300% when the Heller Engineering and Manufacturing Company, Lynwood, California changed to sigma welding to fabricate aluminum engine shipping stands. Because the sigma welds were clean and sound, post-welding treatment was practically eliminated.

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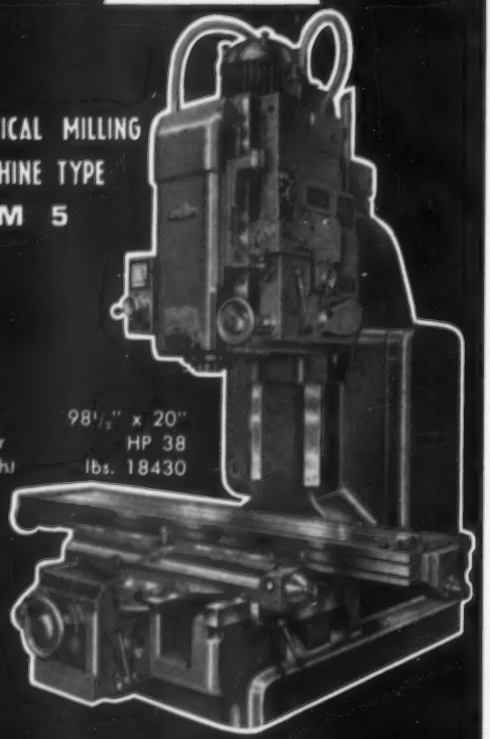
VERTICAL MILLING MACHINE TYPE FVM 5



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Power	HP 38
Weight	lbs. 18430

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- Positive gaging accuracy to fraction of .0001" regardless of who operates it.
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- Reaches to bottom of blind holes. Gages work while still held in chuck.
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- Portable—no wires, hoses or stands.

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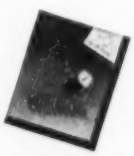

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Belt Driven • Motorized • High Cycle • Special
Let us send you Data Sheets
POPE MACHINERY CORP., 261 River St., Haverhill, Mass.

DAVIS KEYSEATER

This low cost machine will handle internal keyseating jobs up to 1 in.
Write for illustrated bulletin.

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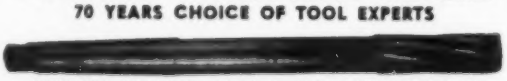

REAMERS, MILLING CUTTERS, END MILLS, SPECIALS
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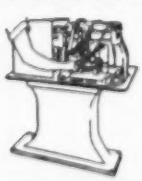

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RB&W FASTENER BRIEFS

RUSSELL, BURDSALL & WARD BOLT AND NUT COMPANY

Technical-ities

By John S. Davey

The important facts about nuts

A nut's purpose is to load the bolt in tension for a tight joint. For this, it is given shear strength greater than the breaking point of the bolt; and sufficient bearing area to avoid crushing or flow of the bearing surface with consequent reduction of tension.

While the thread form of a nut is accurate, its "lead" cannot, for practical purposes, be made identical with that of the bolt. Thus, a nut is made from material plastic enough to allow the threads to deform upon tightening and thereby adjust to distribute the load over many threads rather than concentrate it on the first few.

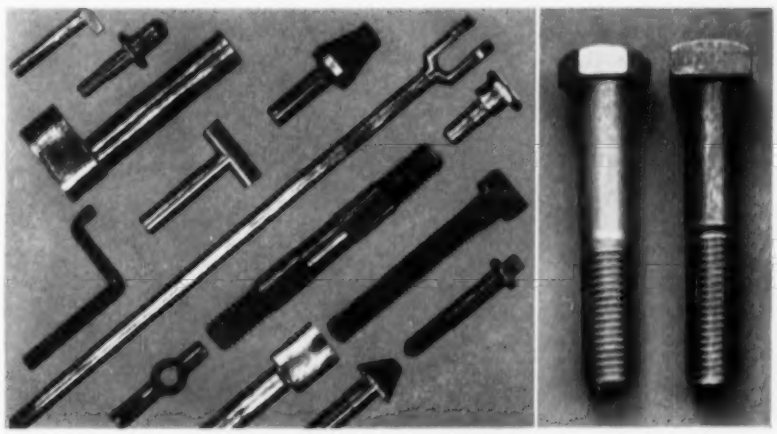
WHAT TO USE

The standard "Finished" nut series satisfies the requirements. It gives not only the required bearing area, but also enough section for proper strength and to minimize the spreading or dilation of a nut when loaded. (The standard "Heavy" nut series is called for only when bolt holes have large clearances, or for high bolt loads.)

As a good general guide to follow, use nuts that are:

1. Made to Am. Std. dimensions;
2. Made from soft, ductile material;
3. Strong enough to break the bolt or screw with which it is used. This would determine whether "Finished" or "Heavy" series is selected.

Cold heading produces strong, low cost parts



Representative range of mechanical parts produced by RB&W by cold heading . . . the same process used to produce the high quality, economical RB&W standard bolts and cap screws shown at right.

Here's a product-improving fact often overlooked: The same forming operation that produces large volumes of strong fasteners at surprisingly low cost can also be used for headed, special mechanical parts.

Cold heading upsets metal along its own axis. Flow lines are continuous, without folds, giving greater head strength against shear, fatigue and impact. Moreover, the material has better quality to start with, since unsound metal would distort or open in the operation and be rejected automatically. Uniformity is assured. Finish is also better.

Designers and production men get all these physical advantages when using RB&W standard bolts and cap screws. They can also have them in special parts at low cost when the need is of sufficient volume to justify machine set-up time. For more information and help on your specific needs, write Russell, Burdsall & Ward Bolt and Nut Company, Port Chester, N.Y.

Plants at: Port Chester, N.Y.; Coraopolis, Pa.; Rock Falls, Ill.; Los Angeles, Calif. Additional offices at: Ardmore (Phila.), Pa.; Pittsburgh; Detroit; Chicago; Dallas; San Francisco.

30% faster assembly— and joints stay tight

When famous-make chain saws were fastened with regular screws plus washers, they loosened on the job. Then SPIN-LOCK screws were used. These not only held tight, they also speeded assembly time 30%. What's more, they cost no more than former screw plus lock washer.

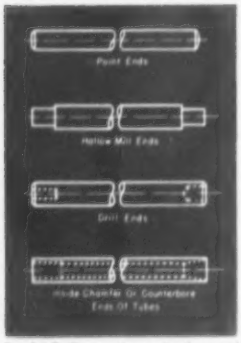
SPIN-LOCK screws have self-anchors in the form of hardened, tiny teeth which dig in and hold under severe service. Various types, sizes and heads available. Send for data or see Sweet's Product Design File.

ECONOMY TYPE 5200

Double End Automatic POINTING MACHINE

Machines both ends Simultaneously. Holds within .005 on length.

For POINTING, HOLLOW MILLING, DRILLING, and THREADING RODS and STUDS • for CHAMFERING INSIDE and OUTSIDE OF TUBES



Typical Operations Performed on TYPE 5200 Double End Automatic Pointing Machines

The Type 5200 Automatic Double End Machine performs operations for which it is suited on diameters of 1/4" through 1-1/2" and lengths 1-1/2" to 30".

Production rates up to 3600 pieces per hour with a stud hopper, easily adjusted for lengths and diameters are possible. For short lengths, an independent automatic hopper feed can be provided.

Spindle speeds and feed rates are infinitely variable within the ranges built into the machine. Feed rates and length of cut of each head are independently controlled. Lengths can be held to .001" per head.

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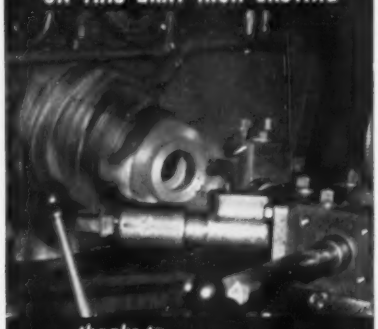

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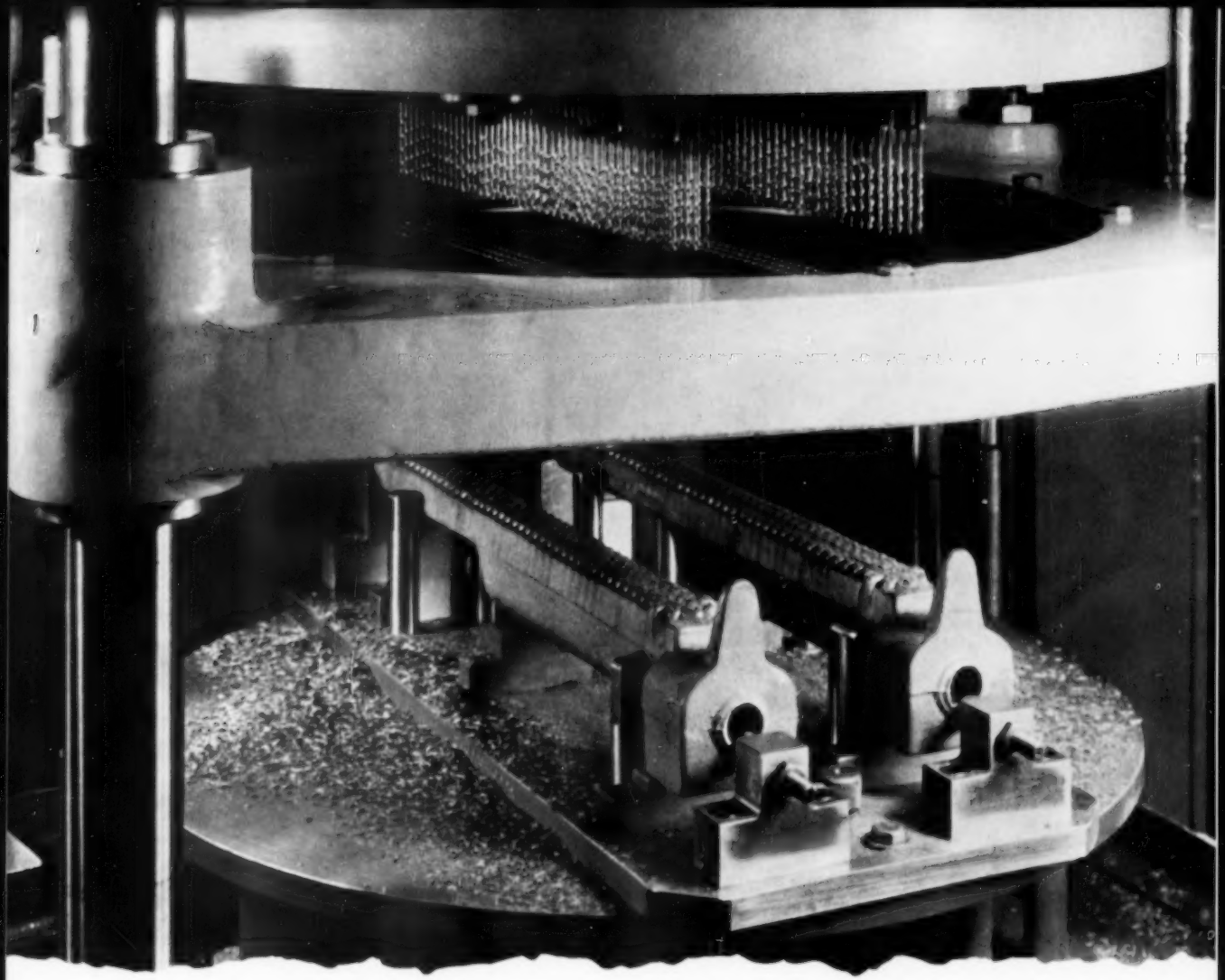

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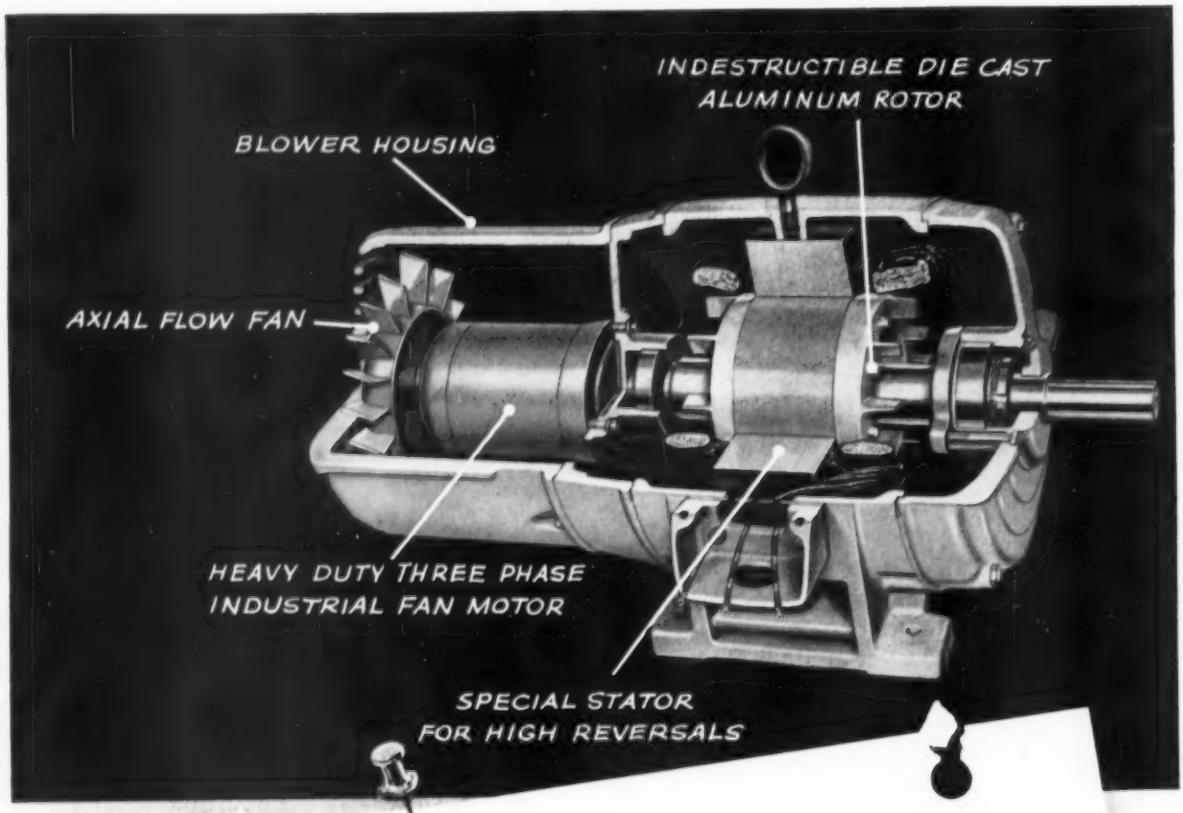

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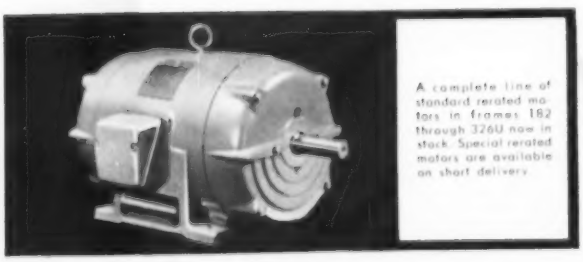

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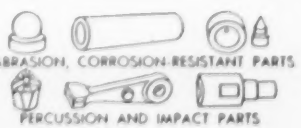
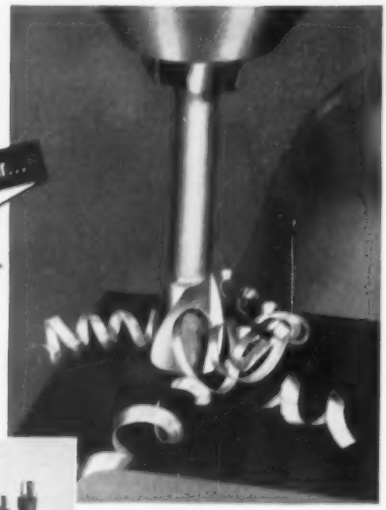


WELDON
"TU-LIP" COUNTERBORES



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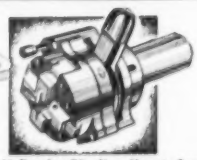

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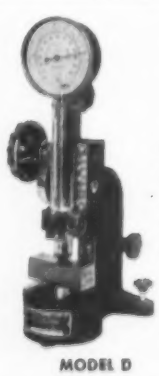

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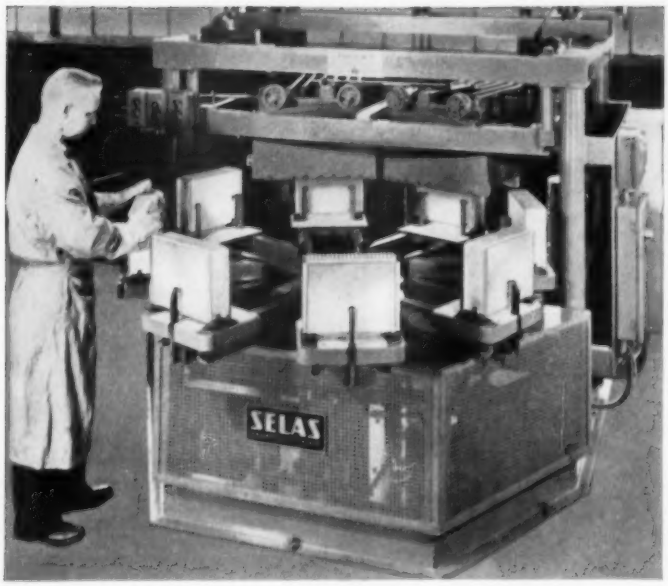

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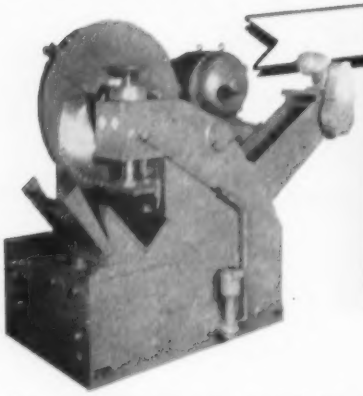

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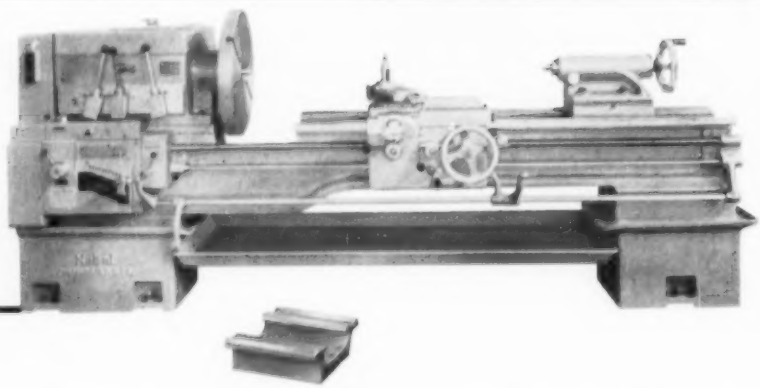

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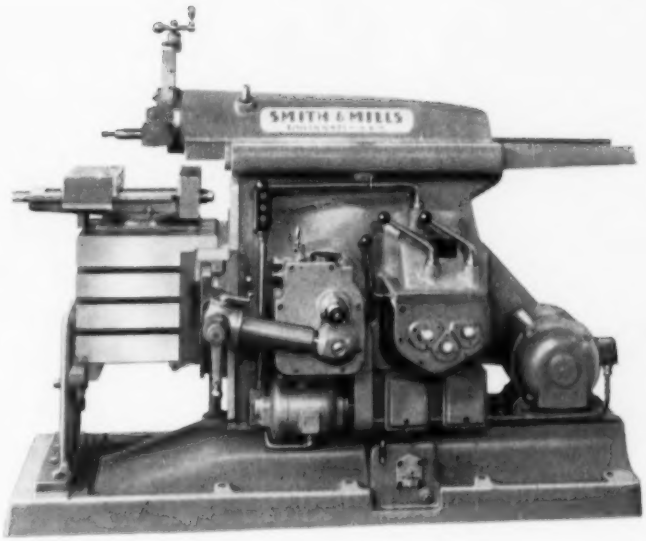

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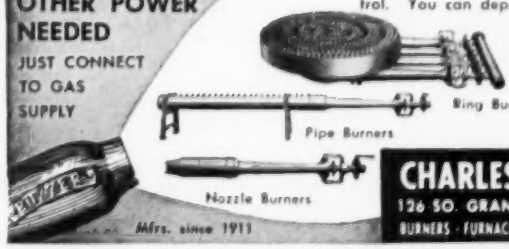

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You can kill space-eating foam and increase productive capacity of machine tools by using Dow Corning silicone defoamers, the most effective defoamers ever developed. Here's how Dow Corning Antifoam A Emulsion increased production in a midwestern auto parts plant:

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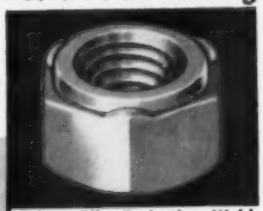
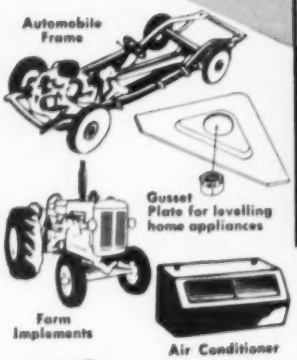


Gripco Pilot-Projection Weld Nut. Circular pilot designed for quick, easy positioning of nut over bolt hole for instant resistant welding. No jigs, no fumbling, no waste of time. Furnished with or without famous Gripco locking feature.



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You can plan on big savings, too, if you make a habit out of reading your 1955 PRODUCTION PLANBOOK issue of *American Machinist*. Hundreds of case histories like the one listed above are found in the "nugget" sections of this issue.

Mine this rich vein of information now. Read it thoroughly and keep it handy for regular reference.

American Machinist

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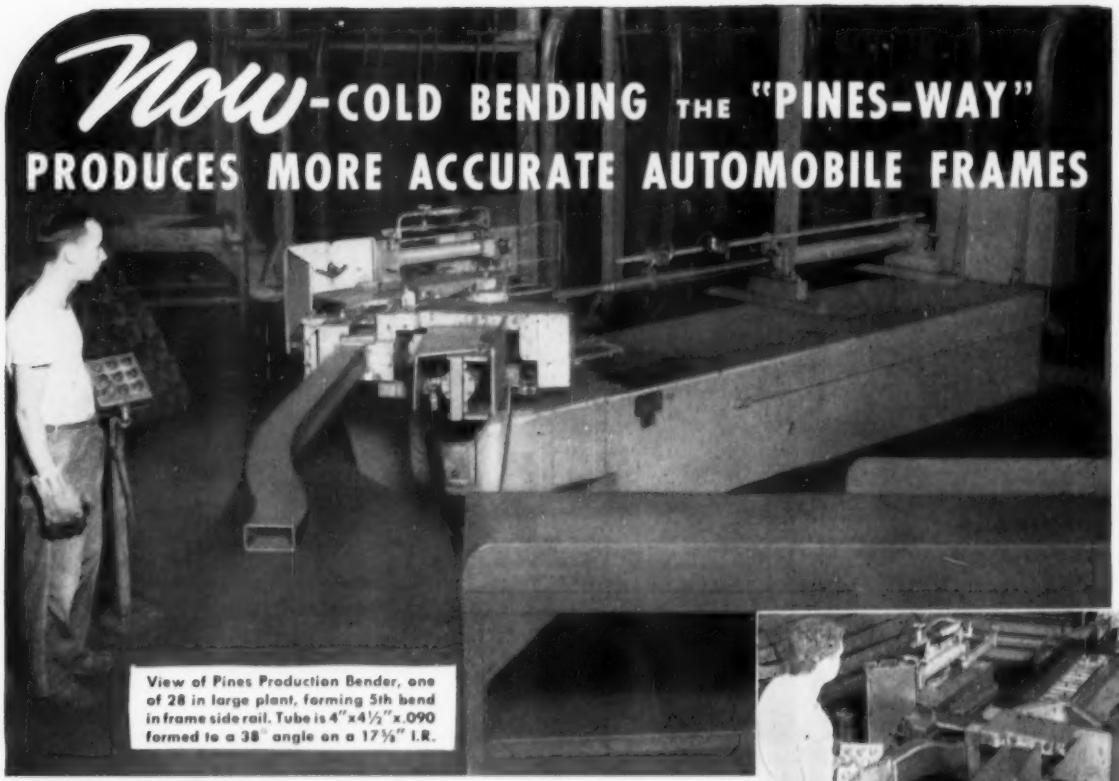
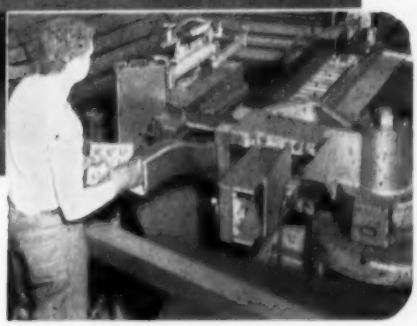
Now-COLD BENDING THE "PINES-WAY" PRODUCES MORE ACCURATE AUTOMOBILE FRAMES



View of Pines Production Bender, one of 28 in large plant, forming 5th bend in frame side rail. Tube is 4"x4½"x.090 formed to a 38° angle on a 17⅝" I.R.



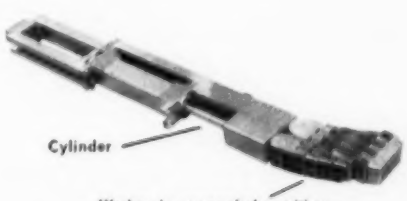
▲ Close-up view of machine used to produce 4th bend in long side rail member. Five different bends are made in this piece, each in sequence on separate machines. Accuracy is held within .030" to .045" at seven check points. Spring-back is easily controlled by simple stop settings — an important factor that cuts tool costs.

Production Bending Methods Simplify Fabricating Problems, Cut Assembly Costs

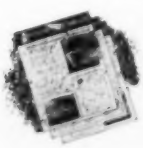
● The unusual versatility of PINES Bending Machine methods is again demonstrated by the successful production line application shown above in a large plant manufacturing automobile frames. Proven by more than eighteen months of operation, a battery of twenty-eight special PINES Benders are now forming tapered welded steel tube frame members at a rate of 120 bends per hour. These machines with their ingenious tooling — designed, developed, and built by PINES — form seven bends in each side rail member and produce more accurate parts than ever before possible. The end result is a stronger, more accurate chassis that greatly reduces body assembly problems.

Typifies Progress in Cold Bending Techniques

This revolutionary new manufacturing method is the result of long months of cooperative efforts between Pines and automotive engineers. It is typical of the consistant progress being made in profitable application of cold bending in the manufacture of a wide variety of metal products. It may also pay you to investigate the design possibilities and the production advantages of cold bending the "Pines-way." At your first opportunity call in our Sales Engineers for free survey.



▲ View of a flexible articulate mandrel used for making a bend at a right angle to, and within, a previously bent section. Mandrel is automatically inserted and expanded. Insures smooth, neat bends.



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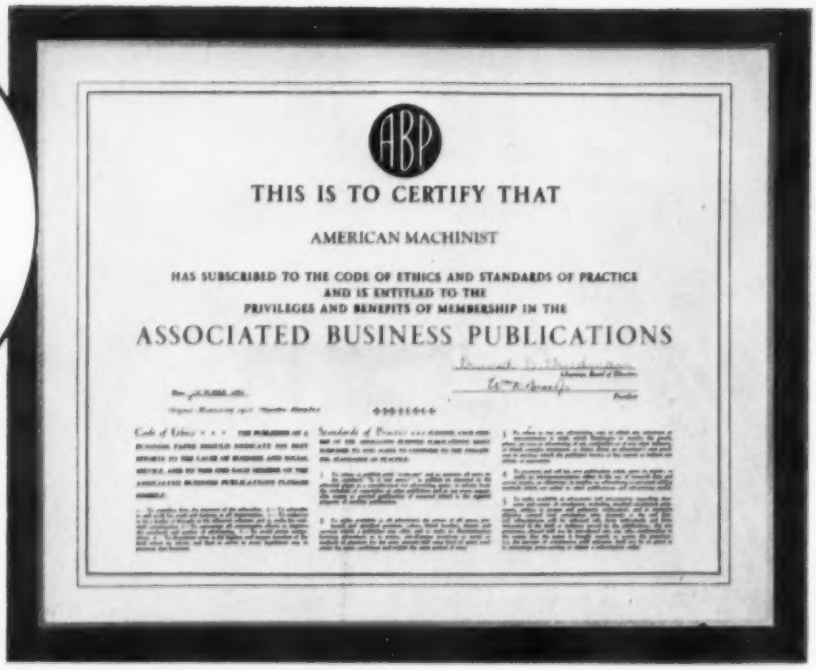
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American Machinist

Gaging . . . *the Surplus Machinery Market*

Here's what they talked about most in Chicago at the annual meeting of the Machinery Dealers' National Association:

Dealer relationships . . . uniform quotation forms . . joint study with the trucking people of the problem of breakage . . . accelerated depreciation . . . rentals and time-payment plans . . . are rentals just about finished? . . . should you sell on 18-36 month time payments?

And someone brought up the idea of policing auction sales, citing some recent auctions in the Detroit area that have left used machinery dealers breathing fire and threatening legal action—having tape recordings made on the spot to prove infractions of Wayne County (Detroit) laws governing conduct of auctions.

Talking about accelerated depreciation, one speaker said there have been cases where used machinery dealers have lost out on sales of top-quality surplus machine tools simply because new machine tool salesmen have come along and pointed out the potential savings to the buyer offered by fast depreciation rates on new machines — something you can't get on used ones.

It's a tough problem, and one that affects every dealer. What to do about it? It was suggested that a lobbyist be hired, that MDNA get the Small Business Administration interested in the problem on the grounds that a large proportion of sales are made to small plants that just can't afford new machines — plants that really need accelerated depreciation to keep their heads above water in this day of mergers and combines. You can expect some action on this from MDNA's new officers soon.

One problem that didn't come up at the NDMA meeting has Philadelphia dealers pretty hot under the collar. At two recent Philadelphia-area bid sales they've had the carpet whisked out from under them by way-out-of-line bids from out-of-towners.

They cite a sale of surplus Navy machine tools in which one big dealer bought three top-condition milling machines for upwards of $7000 each. Said one Philadelphian, "Unless they've got buyers lined up who are willing to pay top prices, I can't see how they expect to make a reasonable profit. Me, I'm a small guy by comparison. I figure the top price I could get for a machine like that is around $8500. That means I've got to haul it back to my place, put it in shape, and guarantee it — all on a profit margin of $1500. I just can't do it, nor can a lot of other dealers my size. The big boys have us caught in a squeeze."

How's business these days? Retiring MDNA President Ben Weiss of Machinery Liquidating Co, Detroit, told Chicago newsmen "Sales of used machine tools have increased 12% over the first quarter of 1956 — the sales trend is continuing upward, with most MDNA members taking a conservative attitude about the next quarter. Gross profits are still declining, with volume of sales to small shops and firms not as encouraging as sales to larger shops."

SEARCHLIGHT SECTION

UNUSUAL ITEMS

J & L 8B Saddle Type Turret Lathe, Cross Sliding Turret.
GISHOLT No. 1L Saddle Type Turret, 2½" Bar.
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W & S No. 3 Ram Type Turret Lathe, 1½" Bar.

B & S No. 2, 14 x 30 Universal Grinder, Int. Spindle.
CINN. 6 x 18 Model ER Plain Grinder, Cycle Infeed.
NORTON 6 x 18, 45° Angular Wheel Slide Grinder, Plunge Cut.
NORTON 16/26 x 72 Type C Hyd. Plain Grinder, Plunge Cut.
THOMPSON 12" x 16" x 60" Hydraulic Surface Grinder.

B & S No. OOG Hi Speed Screw Threaders (2). 1951.
GREENLEE 1" Cap. 6 Spindle Automatic Screw Machine.

GIDDINGS & LEWIS No. 25RT 2½" Bar Horizontal Boring Mill.
HEALD 47A Single End Borematic, Cross Sliding Table.

B & S No. 2B Hi Speed Plain Miller.
BRIDGEPORT 1 HP Tool Room Miller, 1952.
CINN. 0/8 Plain Production Miller.
CINN. 2-18 Rise & Fall Production Miller, Cam Roller Attachment.
KEMPSMITH No. 3G Plain Miller.
K & T No. 2H Plain Miller.
K & T No. 5H Plain Miller.
K & T No. 2 HL Swivel Head Vertical Miller.
PRATT & WHITNEY Model M-30 Single Spindle Profile Miller.
INGERSOLL 42 x 42 x 14' Double Housing Adjustable Rail Planer Type Miller, 1940.

LEHMAN 16 x 30 Hydrotel Lathe, Taper Attach.
MONARCH 14" x 30" Model C Tool Room Lathe
SUNDSTRAND No. 8 Stub Lathe, Air Tailstock.

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28"x20' bed Lodge & Shipley lathe, 10 HP Turner drive, taper attachment.
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Model 5-48 Cincinnati hydraulic duplex mill, new 1941.
Model 34-36 Cincinnati duplex mill, serial 3833D14-4.
No. 74 Heald hydraulic plain internal grinder, w/cross-sliding H.S., new 1941.
No. 72A5 Heald hydraulic plain internal grinder w/extended bridge, new 1943.
No. 1-H-18 Kearney & Trecker simplex mill, late.
2000 Ton No. 6 National Maxipress, all steel frame.
7" No. 76H Baird Chucker, new 1943.
Pratt & Whitney Kellering Machines (6).
Model M24 Kearney & Trecker manufacturing mill, new in 1945.
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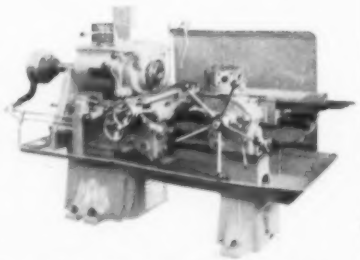
36" No. 36H Gould & Eberhardt gear hobber.
No. 2 Cincinnati filmatic bearing centerless grinder.
4" x 12" No. 4H Landis plain hyd. cylindrical grinder, 1943.
13" x 60" Hanchett vert. spdl. surface grinder, late.
6" x 18' Norton horiz. spdl. surface grinder.
126" x 96 ft. cc. Niles Bement Pond engine lathe.
15"x30" Lipe Carbo-Matic production lathe, 1942.
36" Rockford hydraulic openside shaper-planer.
36" Rockford hydraulic vertical slotter, new 1944.



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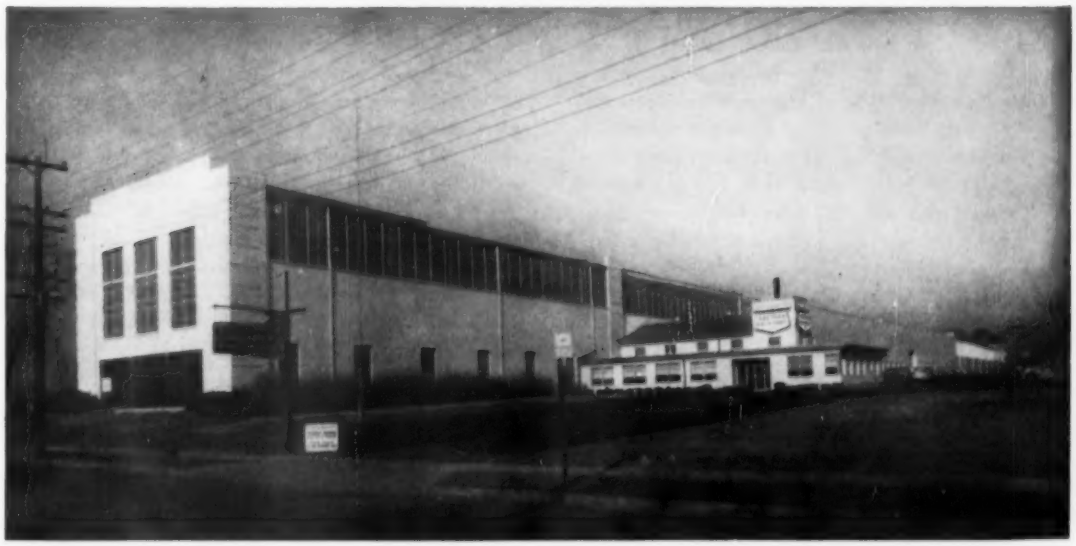

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4x12" Norton Type C Knee Hole Production Type, m.d.
6x15" Cincinnati Plain Hydraulic, m.d.
6x18" Cincinnati Model EA, m.d.
6x18" Cincinnati Model ER, Plain Hydraulic, m.d., Filmatic Spindle
6x18" Landis Type C Hydraulic, m.d., late
10x18" Cincinnati Plain Hydraulic, Model ER, m.d., Filmatic Spindle, 1943
10x18" Cincinnati Model EA, m.d.
10x18" Norton Type C, m.d., latest
10x36" Cincinnati Hydraulic, m.d.
10x36" Norton Type C, m.d.
10x72" Landis, m.d.
10x72" Norton, motorized
12x36" Landis Plain Self-Contained, m.d.
12x96" Landis Plain Self-Contained, m.d.
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14x52" Norton, motorized
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16x72" centers Type C Norton Semi-Auto., Hydraulic
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American Vert. Hyd. Broach 48" str. 15 ton cap. 1947
American 20"x8' Grd. Hd. Lathe motor in base.
Landis 20"x72" and 18"x96" Plain xt. Grinder.
Hanchett 25 H.P. Sp. Vert. Hydr. Surf. Grinder 12"x48" table
W&S No. 2-A Grd. Hd. Univ. Turret Lathe
Bliss 200 T Cap. S.S.S.C.B. Grd. Press 6" Str. 877
Rivett No. 104 A.C. M.D. Internal Grinder.
Milwaukee Nos. 2-B & 3-B Horiz. Plain Millers
DoAll 16" Job Selector Metal Saw.
Cincinnati 36"x36"x10' D.H. Planer 2 Hds. Box Table.
Heald No. 72A-3 Hydr. Int. Grinder Rad Head Sp.
American 28"x22' Bed Grd. Hd. Lathe
Cleveland 30"x8' Table Open Side Planer 2 Hds.
Cincinnati No. 2 Hi-Power S.P.D. Vert. Miller.
H&B #2A Grd. Hd. Horiz. Univ. Miller.
Barnes 20" All Grd. Camel Back Drill 1-Sp.
Blanchard M.D. Vert. Sp. Surf. Grinder 26" chuck.
Sundstrand 4-Sp. Vert. Rigidmill.
Heald #22 Rot. Surf. Grinder 12" chuck 1942.
Landis 2-Sp. 2" Cap. Bolt Threader M.D.
Hendey 16"x8' bed Q.C.G. Lathe 1939.
G & E 24" Gear Box Shaper Tilt. Table Top
Newton 48" Table 1-Sp. Cont. Vert. Miller.
Foster 2-F Fastermatic Hyd. Turret Lathe.
Kempsmith No. 2 Vertical Maximiller M.D.
P & J #2 Auto. Prod. Miller. 2 Tables.
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HEALD #40 single end, single spindle Bore-Matic; late type
HEALD #49 double end four spindle Bore-Matic; late
HEALD #22I single end precision; double spindle; Bore-Matic; late type
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LUCAS No. 42 "Precision" Boring, Milling & Drilling; late type
SELLERS 5" Heavy Duty Boring Mill

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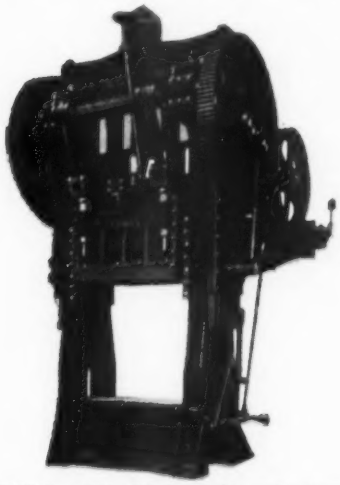
BULLARD 30"x20" Man-au-Trol Tables; late
CINCINNATI 42" Heavy Duty; late type
NILES 100" Heavy Duty; Model F-100-H; New 1951



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BROACHES

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LaPOINTE 15-66" Vertical; model SRV; cap. 30,000#; 66" stroke; New 1947
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OILGEAR XL-6 Horizontal; cap. 3-tons; 36" stroke

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ALLEN No. 3, 4-spindle, No. 4 M.T.; late
AVEY No. 2, 2-spindle Drill Press; late type
BARNES H-2 Hydram; 2" cap.; 22 swing; No. 5 M.T.; Hydraulic; M.D., late type
BARNES model H-3; 3" cap., 24" swing, #5 M.T. Hydram.; late type
BARNES No. 202, Heavy Camel Back; late
FOSDICK 30" "Economax" box column; late
FOSDICK 5BM 4-spindle; late type
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LELAND-GIFFORD No. 1LMS, 4-spindle; M.D.; late
LELAND & GIFFORD #1LMS 2 spindle; M.D.; late
LELAND-GIFFORD Model 2LMS 4-spindle; M.D.
LELAND-GIFFORD model 2LMS, 2-spindle; M.D.

GEAR EQUIPMENT

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BARBER COLMAN Type "B" Hobber; late
BARBER COLMAN No. 3 Precision type and Standard type Gear Hobber; late
BARBER COLMAN Model "T" Gear Hobber; late type
BARBER COLMAN #12 Gear Hobber; M.D.
BILGRAM 6" and 10" Bevel Generator; M.D.
BROWN & SHARPE No. 13 Auto. Gear Cutter; M.D.
BROWN & SHARPE #14 Auto. Gear Cutter; M.D.
CINCIN. No. 4 (36"x12") Gear Cutter; M.D.
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GOULD & EBERHARDT type 12H Universal Mfg. Gear Hobber; late type
GOULD & EBERHARDT 18H Gear Hobber
GOULD & EBERHARDT No. 24H Universal Gear Hobber; late
GOULD & EBERHARDT No. 36BT 4 spindle Bevel Gear Rougher; motor drive
GOULD & EBERHARDT No. 36BM; 3 spindle rougher; M.D.
KOEPFER Model WM-11 Auto Gear Hobber; late type
MICHIGAN 862-24-A, Finisher; 24" cap., 20" face; late type
MICHIGAN Model 854 Gear Shaver; Rack Type, cap. 8" dia.; 2 face; M.D.
PARKSON 6" Gear Tester; late type
PFAUTER #8 Univ. Gear Hobber; late type
PRATT & WHITNEY 10" Gear Grinder; Single or Double Wheel; late type
ROBEY SMITH No. 1 Bevel Gear Planing
SCHUCHARDT & SCHUTTE No. 1 Universal Gear Hobber;
SHEFFIELD No. 201-A Contour Burring Machine; M.D.; late type

GRINDERS—Cylindrical, Plain

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LANDIS 4"x12" Type "H" Hyd., Plain; late
LANDIS 6"x18" Type "H" Plain; late type
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LANDIS 10"x36" Plain; motor drive
LANDIS 10"x36" Type DC plain hd., with infeed; M.D., late type
LANDIS 14"x72" type "C" Plain Hydr.; late
LANDIS 25"x72" Type "D" Crank Pin Grinder; late
LANDIS 10"x72" Type "DC" hydr., late type
LANDIS 10"x96" Type "C" Plain; late
NORTON 4"x12" model CTU Plain; 1953
NORTON 6"x18" Type "C" Plain Cyl., late
NORTON 10"x18" Type "C" Hydr. plain
NORTON 10"x36" Plain; motor drive
NORTON 10"x36" Type "C"; M.D., late
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NORTON 14"x72" Type "C" Plain; rapid wheel head traverse; M.D.; late
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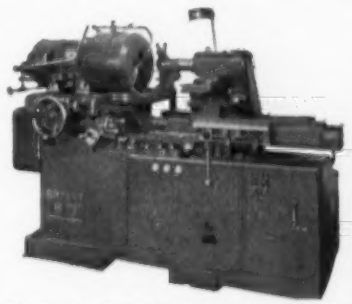

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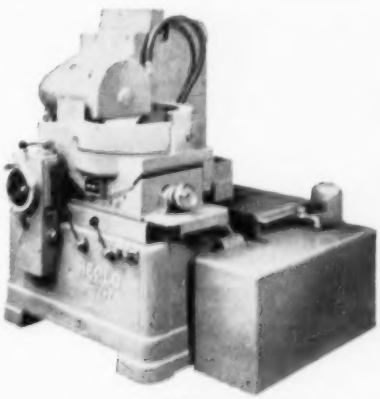

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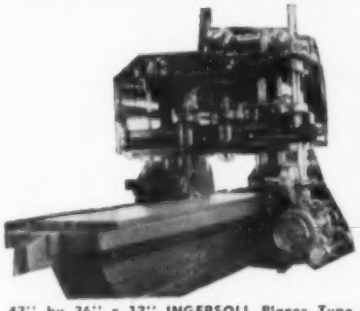

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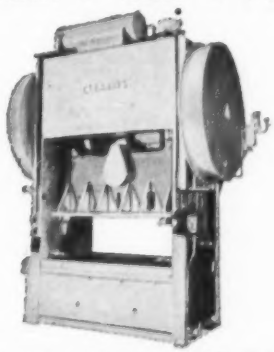

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1 spdl. 20" sw. #2LMS L. G., 1945
1 spdl. 24" sw. #2MA6 Avey, new 1942
1 spdl. 26" sw. #4MS L.G. hydraulic
2 spdl. 24" sw. #3 Avey, AC MD
3 spdl. 20" sw. #2LMS L.G. 1942
5 spdl. 24" sw. #3MS L.G. new 1942
4 spdl. 14" sw. #2LMS L.G. new 1942
6 spdl. 20" sw. #1LMS L.G. new 1943
#314-A Baker Univ. H.D., 1943
16 spdl. Fox #K60H, #2 taper, 1944

BORING MACHINES

Foote Burt Vert. 26" sw. new 1941
#49 Heald Borematic, new 1944

GRINDERS

7"x12" #3 B&S, Rap. Trav., 1940
4"x12" #4H Landis, 1942
4"x18" No. 4H Landis 1943
6"x18" Norton Type C, new 1943
10"x18" Norton Type C, new 1943
10"x36" Norton Type C, new 1942
10"x48" Norton Type C, new 1943
10"x72" Hill-Clarke, AC Mot. Dr.
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10" 20"x36" Norton, angular wheel
14"x48" Landis Type C, new 1941
16"x72" Hill-Clarke, AC Mot. Dr.
16"x26"x72" Norton, AC MD, 1941
42"x72" Norton, extra, new 1947
18"x96" Hill-Clarke, AC Mot. Dr.

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24"x42" Fay Auto. AC MD
36"x120" Putnam Grd. Hd., MD
R14 Seneca Falls, 16"x36", 1942
120"x96" cc S-B-P, ser. 3380
#5W Cinn. Arme Univ. Turret
#4 Gisholt Univ. Tur., A.C. & B.F.
#3AL Gisholt, cross slide Tur. 1941
#3H-10 Libby H.D. Tur. 1942
#4A W&S Turret, new 1945
6PU Fastermatic, tur. 32" sw. 1944
#8D Potter & Johnston, new 1941

MILLERS

54"x30"x16 Ingersoll Slab, 1924
54"x8" Ingersoll Openside, 1942
54" Ingersoll Vertical Rot.
#9V Davis & Thompson Vert., 1944
10"x60" P&W Mod. B Thread Mill
54"T L.H Thread Mill new 1942
No. 2 Cinn. Univ. Hi-Power
#36 Van Norman, Rebuilt, 1941
#1-18 Van Norman Prod. 1942

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60"x48"x30' Hamilton, 4 heads

MISCELLANEOUS

#3L La Pointe 15T Horiz. Broach
6" Gins & DeLeeuw 8 spdls. 1941
#306 Barnes Vert. Hone, new 1942
15 Ton Hyd. American Press, 1946
#11RD 2 Hd. W&S Tapper, latest
#36BM G&E 3 Spdl. Bevel Gr.
#61A Fellows Gr Shaper, 18" cap.
#5A Kaufman Pneu Tapper, 1947
#HH8 Barber Colman Sharp Mach.
16 ga. 42" Economy Power Shear
6"x6" Peerless H.D. Hacksaw, 1943
15 T Toledo Overhead Crane, 39½'

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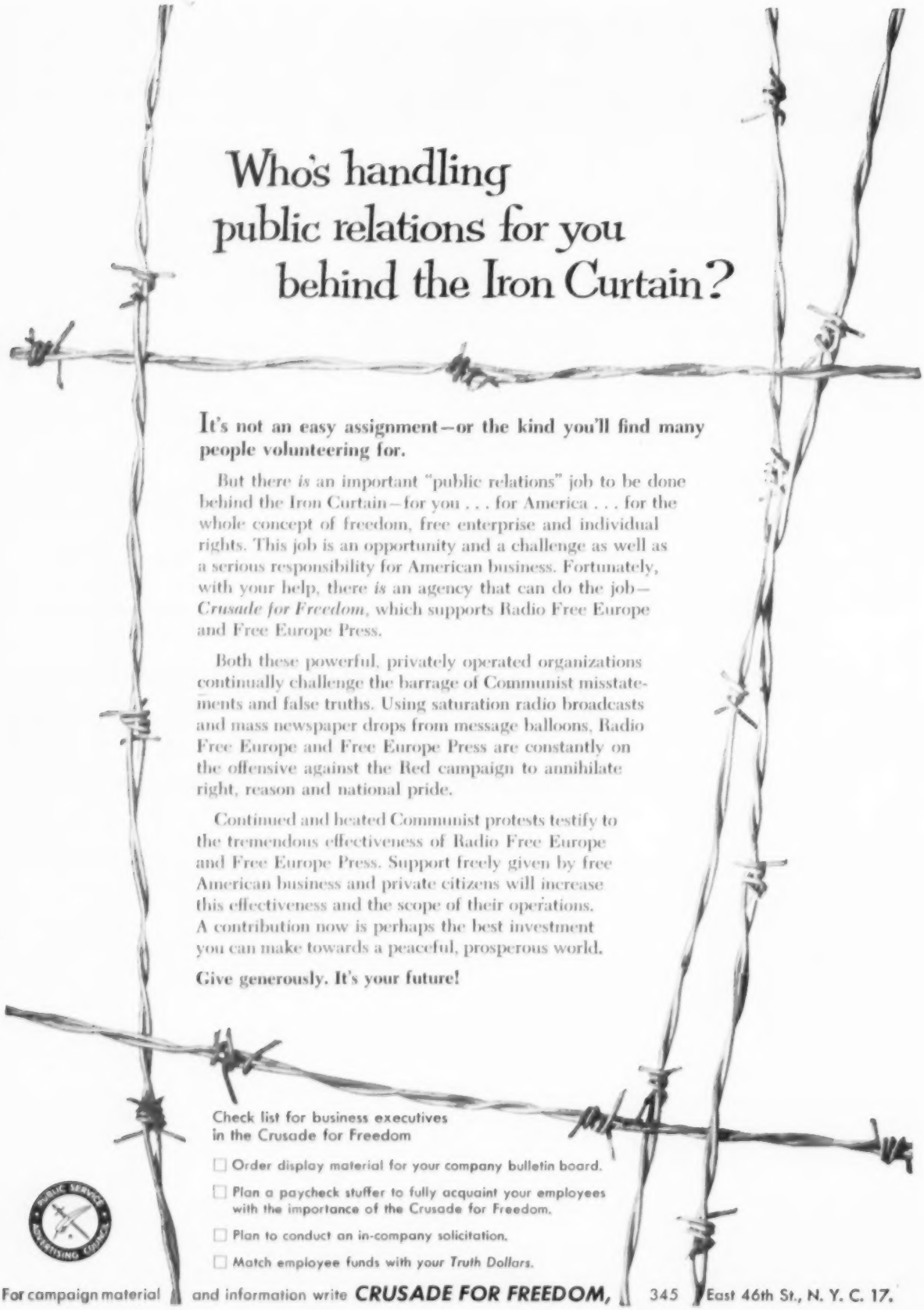

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Index of

PRODUCTS ADVERTISERS

In This Issue

Abrasives, Coated 21, 56
Accessories & Attachments (Machine Tool) 30, 188, 198-199
Adhesives 239
Arbors & Mandrels 258

Balancing Machines 58-59
Bearings 60, 232D
Bending Machines 273
Boring, Drilling & Milling Machines (Horizontal) 14-15, 28-29, 85, 208-209
Boring Machines Internal ..... 2nd Cover, 98
Brazing and Soldering Equipment & Supplies 269
Broaching Machines 26-27, 82

Cams 256
Castings 63
Centering Machines 266, 285
Centrifugal Machines 252
Chucks 80, 203, 211, 216
Collets 55
Compressors, Air 168D
Controls, Electrical 169, 249
Counters 20
Coolant Systems, Filters & Supplies 288
Cut-Off Machines 57, 215, 224, 252, 256
Cutters, Abrasive 31, 229

Die Sets 54, 96
Drilling Machines 42, 61, 75, 86-87, 207, 218, 250, 260, 283, 284
Drill Jig Bushings 177
Duplicators & Pantographs ..... 32, Insert Bet. 32-33, 33, 195
Dust Collectors 202

Electro Plating & Painting Equipment & Supplies 233

(Continued on page 284)

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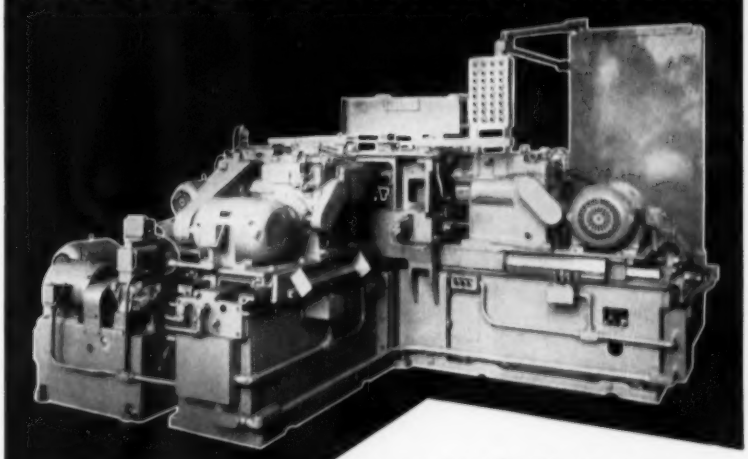

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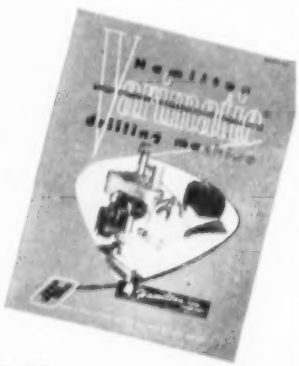

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Index of PRODUCTS ADVERTISERS

In This Issue

•

(Continued from page 283)

Fabricating Methods & Services 256

Fasteners 186, 241, 263, 272

Gages & Instruments 34, 72, 88-89, 94-95, 189, 190, 196, 217, 235, 262, 266, 268, 285

Gear Cutting Machines 3, 6-7, 68-69, 240, 259

Gears, Speed Reducer, Motor Reducers 64, 200

Gear Testers 3, 6-7

Grinders—Cutter & Tool 260, 264

Grinding Machines—Production 12-13, 18-19, 36-37, 50, 70-71, 91, 254

Grinding Wheels 21, Insert Facing 64, 225

Heads: Drilling, Grinding & Tapping 74, 207, 218, 238, 266

Heat Treating Equipment & Supplies 46-47, 220, 253, 267, 269, 271

Honing Machines 257

Hydraulic & Pneumatic Parts & Equipment 76-77, 109, 179

Jig-Borers 183, 254, 261

Jigs & Fixtures 256

Lapping Machines 197

Lathes, Automatic 22-23, 223

Lathes, Engine 24-25, 32, Insert Bet. 32-33, 33, 35, 44-45, 78-79, 195, 221, 237, 258, 270

Lubricants, Cutting Fluids, Quenching Oils & Solvents 48-49, 106, 185, Insert Bet. 200-201, 205, 272

Lubricating Systems & Equipment 246

Marking Machines, Tools, & Supplies 92, 222, 262, 283

Materials, Cutting & Forming 4th Cover, 94-95, 201, 219, 232A, 248, 256, 265

Materials of Manufacture 38, 43, 84, 110, 148, 150, 152, 191, 228, 236, 242, 248, 251, 264, 268, 270, 272

Index of

PRODUCTS ADVERTISED

In This Issue

•

Materials Handling Equipment 61B, 188, 271

Millers, Die Sinkers, Profilers 4-5, 8-9, 51, 83, 145, 221, 252, 262, 285

Motors, Electrical 52-53, 102, 168A, 264B

Nibbli g Machines 224

Presses, Forging & Forming Equipment & Supplies 57, 146, Insert Bet. 168A-168D, 175, 181, 200, 210, 213, 230, 243, 247

Production, Inventory & Tool Control 187

Pumps, Circulating 270

Riveting Machines 256

Safety & Welfare Equipment 191, 288

Saw Blades 94-95, 219, 231

Sawing Machines 62, 256

Screwdriving & Nutrunning Machines 76-77

Screw Machines; Chucking Machines 16-17, 32, Insert Bet. 32-33, 33, 65, 73, 74, 232

Shapers, Slotters, Keyseaters 40-41, 112, 262, 271

Special Machine Tools 39, 61, 66-67, 81, 104-105, 173, 184, 214, 256, 283

Spindles, Machine 262, 268

Tapping Machines 86-87

Thread Cutting Machines 234

Thread Rolling Machines & Tools 10-11, 93

Tools, Cutting 3rd Cover, 90, 100, 109, 171, 189, 198-199, 202, 204, 206, 252, 255, 260, 262, Insert Facing 264, 265, 266

Tools, Portable 215

Used & Surplus Equipment 275-281

Vibration Control & Mountings 194

Welding & Cutting, Equipment & Supplies 212-261

Wipers Industrial Insert Bet. 232A-232D

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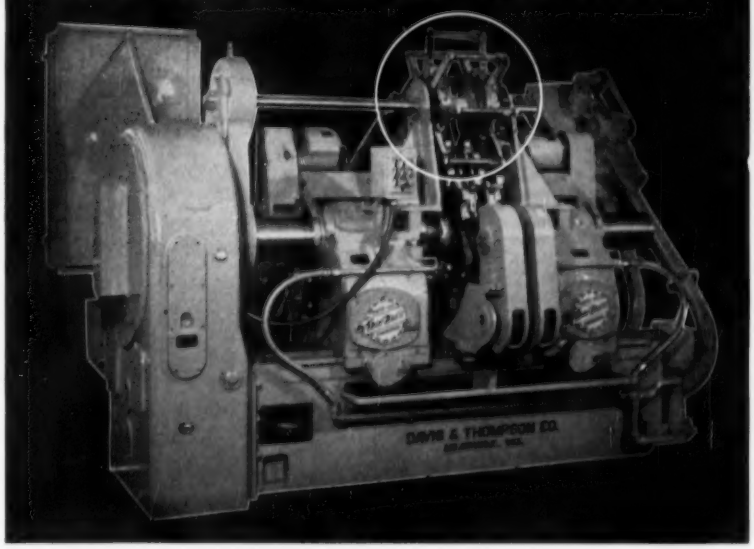

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ADVERTISERS INDEX

This index is published as a convenience to the readers. Every care is taken to make it accurate, but AMERICAN MACHINIST assumes no responsibility for errors or omissions.

	Page
Aaron Machinery Company	221
Ace Drill Corporation	202
Acromark Company	262
Adamas Carbide Corp.	201
Allegheny Ludlum Steel Corp.	232A
Allis-Chalmers Manufacturing Co.	168A
Allis Company, Louis	264B
Allison Company	229
Alvord-Polk Tool Company	262
American Broach & Machine Co.	82
American Chain & Cable Co., Inc.	64B
American Gear & Mfg. Co.	200
American Machinist	244-245, 274
American Sip Corporation	183
American Smelting & Refining Co.	63
American Tool Works	35
Armco Steel Corp.	110
Armstrong-Blum Mfg. Co.	62
Armstrong Bros. Tool Co.	30
Aro Equipment Corp.	250
Axelson Mfg. Co. Div. of U. S. Industries Inc.	44-45
Baird Machine Company	175
Baker Bros., Inc.	184
Barber-Colman Company	68-69
Barnes Co., W. F. & John	81
Barrett Co., Leon J.	252
Bath Co. Inc., John	34
Bausch Machine Tool Co.	173
Bay State Tap & Die Company	100
Behr-Manning Corp.	56
Bellows Company	61
Blake Co., Edward	260
Blanchard Machine Co.	50
Bryant Chucking Grinder Company	16-17
Bryant Machinery & Engineering Co.	42
Buhr Machine Tool Co.	104-105
Bullard Company	85
Cadillac Gage Company	217
Capewell Mfg. Co.	231
Carborundum Company Insert Facing 64, 264, 268, 270	
Century Electric Company	52-53
Chase Brass & Copper Co., Inc.	228
Chicago-Latrobe Company	204
Chicago Pneumatic Tool Company	76-77
Chisholm Moore Hoist Div. Columbus McKinnon Chain Corp.	271
Cincinnati-Bickford Tool Co. Sub. Giddings & Lewis Machine Tool Co.	75
Cincinnati Gilbert Machine Tool Co.	208-209
Cincinnati Milling Machine Co.	4-5
Cincinnati Shaper Company	40-41, 112
Cleereman Machine Tool Company	42
Cleveland Twist Drill Co. Insert Facing	264
Climax Molybdenum Co. of New York	148
Columbia-Geneva Steel Div.	43
Columbus Die-Tool & Machine Co.	256
Comtor Co.	262
Cone Automatic Machine Co.	65
Copperweld Steel Company	150
Crane Packing Co.	197
Crucible Steel Co. of America	84
Curtis Pneumatic Machinery Div. Curtis Mfg. Co.	168D
Cushman Chuck Company	203
Danly Machine Specialties Inc. 96, Insert Bet.	168A-168D
Davis & Thompson Company	285
Davis Keyseater Company	262
Delta Power Tool Division Rockwell Mfg. Co.	237
Dollinger Corporation	288
Dow Corning Corporation	272
Dreis & Krump. Manufacturing Co.	230
Eastern Machine Screw Corporation	266
Eastman Kodak Co., Special Products Division	235
Economy Engineering Co.	264
Eisler Engineering Co., Inc.	256
Ex-Cell-O Corp.	98
Farval Corporation	246
Federal Products Corp.	88-89
Fellows Gear Shaper Company	6-7
Felters Company	194
Fenway Machine Sales Company, Inc.	224
Firth Sterling Inc.	248
Foote Gear Works, Brad	200
Fosdick Machine Tool Company	207
Gardner Machine Company	21
General Electric Company Apparatus Dept.	46-47
Giddings & Lewis Machine Tool Company	14-15
Gisholt Machine Company	58-59
Gleason Works	3
Goss & DeLeeuw Machine Company	232
Grant Mfg. & Machine Company	256
Gray Co., G. A.	28-29
Greenlee Brothers	214
Grip Nut Company	272
Gulf Oil Corporation	205
Hamilton Tool Company	284
Hannifin Corp.	200
Hanson-Whitney Company Division of Whitney Chain Company	234
Hardinge Brothers, Inc.	55
Heald Machine Co. Sub. Cincinnati Milling Machine Co.	2nd Cover
Hebert Equipment Company	266
Hendey Div. of Barber Colman Co.	78-79
Hill Acme Company Acme Machine Div.	247
Hirschmann Company, Carl	223
Holcroft & Company	220
Hones, Inc., Charles A.	271
Horton & Sons Co., E.	80
Hy-Pro Tool Co.	189
Illinois Tool Works	171
Ingersoll Milling Machine Co.	145
Jacobs Mfg. Company	211
Jahn Manufacturing Co., B.	210
Johnson & Son, Inc., S. C.	48-49
Jones & Laughlin Steel Corp.	251
Kearney & Trecker Corp.	39
Kennametal Inc.	265
Kent-Owens Machine Company	51
King Tester Corporation	196

ADVERTISERS INDEX

	Page
Landis Machine Company	10-11
Landis Tool Company	12-13
LaPointe Machine Tool Company	26-27
Lavallee & Ide Inc.	90
LeBlond Machine Tool Co., R. K.	24-25
Lees-Bradner Company	240
Lincoln Park Industries, Inc.	233
Linde Air Products Div. Union Carbide Corp.	261
Linley Brothers Co.	264
Lipe-Rollway Corp.	188
Lodge & Shipley Company	57
Mallory & Company, Inc., P. R.	212
Manco Mfg. Co.	215
Maschinenfabrik Lorenz A. G.	259
Master Electric Company	102
M. B. I. Export & Import Ltd.	258
McCaskey Industrial Div. Victor Adding Machine Company	187
McGill Mfg. Co.	232D
McKay Machine Co.	181
Melborn Co.	262
Metal Carbides Corp.	256
Metal Treating Institute	253
Micro Switch Div. Minneapolis-Honeywell Regulator Co.	249
Milford Rivet & Machine Co.	186
Minganti & C., Giuseppe	262
Minnesota Mining & Mfg. Co.	239
Minster Machine Company	243
Moline Tool Company	283
Monarch Machine Tool Company	195
Monsanto Chemical Co.	191
Moore Special Tool Co., Inc.	254
Morris Machine Tool Co.	66-67
National Acme Company	73, 74
National Automatic Tool Co., Inc.	86-87
Nebel Machine Tool Corp.	270-271
Nelco Tool Co., Inc.	206
New Britain Machine Company, The	32, Insert Bet. 32 & 33, 33
Nichols-Morris Corporation	83
Noble & Westbrook Mfg. Co.	92
Norton Company	18-19, 31
O.K. Tool Co.	3rd Cover
Oliver Corp. A. B. Farquhar Div.	192-193
Parker Stamp Works Inc.	222
Peninsular Grinding Wheel Div. Abrasive & Metal Products Co.	225
Philadelphia Gear Works	64, 224
Pines Engineering Co. Inc.	273
Pittsburgh Gear Company	200
Pope Machinery Corp.	262
Pratt & Whitney Co. Inc.	190, 213
Randall Co., Inc., Frank E.	266
Reed Rolled Thread Die Company	93
Reid Brothers Co., Inc.	91
Ross Operating Valve Company	179
Russell Burdsall & Ward Bolt & Nut Company	263
Ruthman Machinery Company	270
Ryerson & Sons Inc., Joseph T.	152
S. K. F. Industries Inc.	60
Sargeant & Wilbur Inc.	267
Scherr Co., Inc., George	285
Schmarje Tool Co.	260
Scott Paper Company	Insert Bet. 232A & 232D
Scripta	283
Selas Corp. of America	269
Severance Tool Industries Inc.	252
Shell Oil Co.	185
Shore Instrument & Mfg. Co. Inc.	268
Simonds Saw & Steel Co.	219
Smith & Mills Shaper Div.	271
South Bend Lathe Works	258
Springfield Machine Tool Co.	70-71
Square D Co.	169
Stahl Gear & Machine Company	266
Standard Pressed Steel Co.	241
Starrett Co., L. S., The	94-95
Sun Oil Company	Insert Bet. 200 & 201
Super Tool Company Sub. of Van Norman Industries, Inc.	255
Superior Steel Products Corp.	54
Supreme Products, Inc.	216
Taft-Peirce Mfg. Company	72
Tennessee Coal & Iron Div.	43
Texas Co.	106
Thompson Grinder Company	36-37
Timken Roller Bearing Company Steel & Tube Div.	4th Cover
Tomkins-Johnson Company	109
Torit Manufacturing Company	202
Townsend Mfg. Co., H. P.	260
Triplex Machine Tool Corp.	256
Union Carbide & Carbon Corp.	261
United States Drill Head Co.	238
United States Steel Corp.	38, 43
United States Steel Export Co.	43
United States Steel Supply Div. United States Steel Corp.	38, 43
Universal Engineering Corp	177
Van Norman Machine Co.	8-9
Vapor Blast Mfg. Co.	257
Vascaloy Ramet Corporation	198-199
Veeder-Root Inc.	20
Verson Allsteel Press Co.	146
Waltham Machine Works	252
Warner & Swasey Company	22-23
Weldon Tool Company	266
Whitnon Mfg. Co.	268
Wyckoff Steel Company	236
Youngstown Sheet & Tube Company	242
Zagar Tool Inc.	218

CLASSIFIED ADVERTISING

F. J. Eberle, Business Mgr.

EMPLOYMENT OPPORTUNITIES 280

SPECIAL SERVICES
- Contract Work 280
- Eastern Machine Screw Corp. 280
- General Pattern Works 280
- Poorman Inc., I. E. 280

EQUIPMENT
(Used or Surplus New)
- For Sale 275-281

WANTED
- Equipment 280

ADVERTISERS INDEX

- ABC Machine Tool Co. 280
- Acme Trading Co. 276
- Albert Tool & Gage Co. 278
- Bennett Machinery Co. 276
- Barnz Co., Inc., Otto 276
- Brownell Machine Tools Inc., Hazard 276
- Deny Machinery Co. 276
- Eastern Machinery Co., The 277
- Falk Machinery Co. 281
- Globe Trading Co. 278
- Hill Clarke Machinery Co. 281
- Hyman & Sons, Joseph 281
- Indianapolis Machinery & Supply Co. 278
- Machine Tool Publications 280
- McDonald Machinery Co. 278
- Miles Machinery Co. 276
- Moore Machinery Co. 276
- Morey Machinery Co., Inc. 279
- Motch & Merryweather Machy. Co. 278
- National Machinery Exchange 280
- Press & Shear Machinery Corp. 276
- Samson Machinery Co. 280
- Scherer Corp., R. P. 278
- Shwayder Co., The 280
- United Machinery & Tool Corp. 275
- Williams, E. H. 281
- Walley & Associates 280

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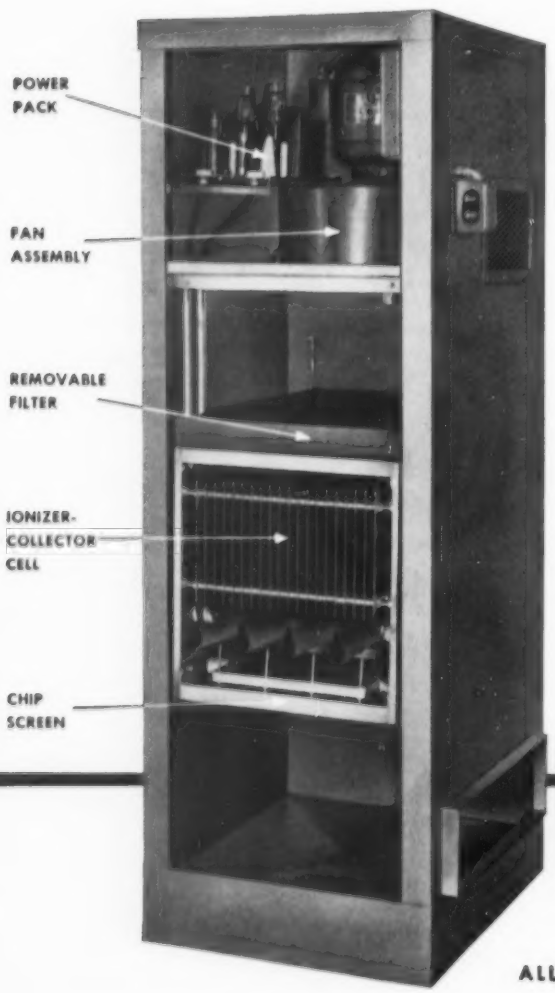

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